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Tongass National Forest

Annual Monitoring & Evaluation Report for Fiscal Year 2002

United States Department of Agriculture
Forest Service
Alaska Region
Tongass National Forest
648 Mission Street
Ketchikan, AK 99901
907-225-3101
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File Code: 1920/2500
Date: July 7, 2003

Dear Reader:

Enclosed is the Monitoring & Evaluation Report for the Tongass National Forest for fiscal year 2002. This reports Tongass National Forest monitoring, as specified in Chapter 6 of the Tongass Land Management Plan (TLMP).

This report summarizes specific monitoring that was completed during fiscal year 2002. We are continuing to work to complete some of our monitoring protocols. The report includes status updates and action plans for these protocols. Some of this monitoring was completed for activities that were conducted prior to the implementation of the Revised Forest Plan.

The mailing list for distribution of this report is updated each year based on receipt of response forms provided in the report (see next page). Please fill out the mail request form to notify us if you would like to receive future Tongass Monitoring and Evaluation reports. Persons or groups not responding will be deleted from the mailing list.

Additional copies of the Annual Monitoring and Evaluation Report are available from the Tongass National Forest through request from the Ketchikan Supervisor's Office. Please contact Carol Seitz Warmuth at 907-228-6341 with questions or requests for additional copies.

Sincerely,

Thomas Puchlerz

THOMAS PUCHLERZ
Forest Supervisor

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Dear Reader:

Your name is currently on our mailing list of those who are to receive the Tongass National Forest Annual Monitoring & Evaluation Reports. If you would like to receive the fiscal year 2003 report, which we will publish and mail in July 2004, please mark the appropriate blank below and return this form to our office by August 29, 2003.

Please note that persons or groups not returning this form will be deleted from the mailing list, and will no longer receive copies of the monitoring report.

This letter will serve as a Response Form for our mailing list. It includes a return address on the reverse side. Please tear out, fill in the information below, and return to our office in Ketchikan, Alaska.

You may also fax this form to Carol Seitz Warmuth at 907-228-6341, or e-mail a reply to cseitzwarmuth@fs.fed.us

Sincerely,

Thomas Puchlerz

THOMAS PUCHLERZ
Forest Supervisor

(Name) _____

(Address) _____

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USDA Forest Service
Tongass National Forest
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Ketchikan, AK 99901-6591

Attn: Carol Seitz Warmuth

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Tongass National Forest

Annual Monitoring & Evaluation Report for Fiscal Year 2002

U. S. Department of Agriculture, Forest Service
Tongass National Forest
Ketchikan, Alaska

July 2003

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Chapter 1
Setting the Context

Monitoring and Evaluation

Monitoring and evaluation are quality control processes for implementation of the Forest Plan. Information detailing implementation, effectiveness, and validation monitoring, as directed through the Forest Plan, is provided through the monitoring and evaluation report. Monitoring and evaluation comprise essential feedback mechanisms to ensure the Forest Plan is responsive to changes. The evaluation process provides feedback that identifies the necessity for corrective action.

The Forest monitoring and evaluation report relates the Forest status relative to the Forest Plan strategic goals. The report is organized into three chapters followed by an appendix. The first chapter provides an overview of the past, present, and desired conditions for the Forest. This chapter was developed utilizing the Montreal Process Criteria as a framework. The second chapter specifically addresses the monitoring questions defined in the Forest Plan. Appendix A provides a summary of the monitoring questions. Detailed monitoring results and specific evaluation are provided for each monitoring question. The third chapter relates the status of the Forest relative to the Forest Service Strategic Plan. This chapter provides a synthesis of the monitoring evaluations and action plans for resource management to ensure focus toward Forest goals.

A mid-term review of the Forest Plan has been initiated. The review will continue through FY 2003. This review is consistent with the forest planning regulations and will serve to evaluate the effectiveness of the old growth and riparian direction, as outlined in the Forest Plan. See the National Forest management Act planning regulation 219.10, which states …

> "*The Forest Supervisor shall review conditions on the land covered by the plan*"…for a midterm review…"*to determine whether conditions or demands of the public have changed significantly.*"

The review will include an evaluation of the effectiveness of the Plan's old growth strategy and riparian direction to conserve biodiversity and prevent the need to list species under the Endangered Species Act (ESA). The evaluation will be conducted in collaboration with the appropriate Federal and State agencies. Any needed changes in the plan's direction will be incorporated through the amendment or revision process (USDA Forest Service 1997). According to the National Forest Management Act planning regulation 219.10 (g) the Forest Supervisor shall review conditions on the land covered by the plan at least every five years to determine whether conditions or demands of the public have changed significantly.

Introduction

Chapter 1 is an overview of the past, present and desired conditions, in the context of the 1995 Montreal Process (MP) Criteria and Indicators (C&I) of sustainable management. The criteria relate specifically to forest conditions and functions, and to the values and benefits associated with the environmental and socio-economic goods and services provided by the forests.

It is essential that planners focus on sustainability, and that our uses of the forests today do not impair the functioning of ecological processes and the ability of these natural resources to contribute economically and socially into the future. 36 CFR 219.11 states "[The] *annual monitoring and evaluation report … must include … (3) A description of the trend(s) toward achieving goals or desired conditions and sustainability….*" It further states that "*achievement of ecological, social and economic sustainability is the overall goal for management of National Forest System land.*"

The forest planning regulations (36 CFR 219) are designed to address and help ameliorate problems associated with a highly fragmented environment. The Montreal Process C&I framework provides a common language and unified measurement for improved communications between the various partners, and enables integration of social, economic and ecological factors into indicators of sustainability. The C&I do not substitute for, or undermine, following law and regulation, but are to be viewed as a "face" for sustainability and as a means of organizing large amounts of information.

The Montreal Process Criteria and Indicators are related to Tongass National Forest monitoring activities through the forest planning regulations (36 CFR 219), the October 2000 Forest Service Strategic Plan, and the Local Unit Criteria and Indicator Development project (LUCID). The Tongass National Forest Land and Resource Management Plan (Forest Plan) along with the Monitoring and Evaluation (M&E) Plan establishes the strategic monitoring framework for the Tongass.

The Montreal Process Criteria and Indicators have seven criteria that address various elements of sustainability of forested lands. The criteria are:

I. Conservation of biological diversity.

II. Maintenance of productive capacities of ecosystems.

III. Maintenance of forest ecosystem health and vitality.

IV. Conservation and maintenance of soil and water resources.

V. Maintenance of forest contribution to global carbon cycles.

VI. Maintenance and enhancement of multiple socio-economic benefits to meet the needs of societies.

VII. Legal, institutional and economic framework for forest conservation and sustainable management.

Description of Past and Present Management, and the Desired Condition

The discussion for each of the seven criteria is presented in three parts. The "Past" describes the historic perspective of management on the Tongass National Forest. The history of Tongass National Forest management is briefly described below, giving a general reference point for the discussion for each of the criteria.

The "Present" generally describes the current management direction and conditions. This can be related to the criteria through the Goals and Objectives for each of the 19 land use designations (LUDs) in the Forest Plan.

The "Desired Condition" describes the future management condition desired for each of the 19 LUDs. In addition, desired conditions are somewhat embedded in the Forest-wide standards and guidelines. The standards and guidelines are developed to protect or create a specific condition. The Desired Condition for each of the 19 LUDs is described in Table 1. The discussion for each Criteria and Indicator will not include the complete description of each of the Desired Conditions, but will list the land use designation abbreviation, which can be cross-referenced to Table 1 for the description.

Past Management History

The Organic Administration Act of 1897, the basis of the National Forest System, provided direction to "improve and protect" Federal forested lands. The Act also affirmed the intent to provide for sustainable protection and use of the forest reserves.

The "core" of the Tongass National Forest was the Alexander Archipelago Forest Reserve, created by proclamation on August 20, 1902, by President Theodore Roosevelt. A second national forest, the Tongass, came to life by proclamation on September 10, 1907. The Alexander Archipelago and the Tongass were combined into a single National Forest (the Tongass), totaling 6.8 million acres, on July 1, 1908. An additional 8.7 million acres was added, by the third proclamation concerning the Tongass, on February 16, 1909. The Alaska National Interest Lands Conservation Act (ANILCA) was the next (and last) major addition to the National Forest land base.

Early management on the Tongass National Forest focused primarily on small timber sales, mining, and investigations of timber trespass. Sawmills were generally small and local in nature. Several pulp operations were started over the years, but seldom lasted long. After the creation of Glacier Bay National Park, investigations were made to include additional portions of the Tongass in the National Park System; nothing came of these efforts. One notable conservation program made as a result of these investigations was the establishment of a wildlife preserve on Admiralty Island for the protection of brown bears. In the 1950's, several long-term, large-scale timber sale contracts were created to provide for the economic growth of Southeast Alaska. Formalized management plans were generally local in nature, and very broad and generalized in content.

The Multiple-Use Sustained-Yield Act (MUSYA) of 1960 reaffirmed the principals of sustainability for the broad spectrum of natural resources found on National Forest System lands. Multiple Use Plans were

developed for areas of the Tongass NF, but were, again, fairly local in nature and fairly general. The National Environmental Policy Act of 1969 led to environmental assessments that addressed the environmental effects on ecological systems and natural resources. The passage of the National Forest Management Act of 1976 (NFMA), which amended the MUSY, directed that forests develop land and resource management plans that provided for multiple uses and sustained yield in accordance with the MUSYA. In addition, consideration of environmental components such as ecosystems and biological diversity were to be provided for in forest and project planning.

The immediate direct result of the NFMA was the development of the 1979 Tongass Land Management Plan (TLMP), the first completed forest resource plan in the nation. The 1979 TLMP was a basic plan that established four land use designations with broad management direction. Two of the land use designations identified very large areas to be managed in an unroaded condition (areas recommended for Wilderness designation, including the two National Monuments proclaimed in 1979, and areas to be managed to preserve primitive conditions). One element established in the 1979 TLMP was a monitoring plan. The Alaska Regional Guide (1980) established specific standards and guidelines and other management direction for National Forest management. The direction in the Regional Guide better described the measures to be taken for the protection and management of the Tongass NF.

The Alaska National Interest Lands Conservation Act (1980) transferred large blocks of other Federal agency lands to the Tongass NF, established 14 Wilderness Areas, and congressionally affirmed the establishment of two National Monuments. These wildernesses were established to preserve unique ecosystems, assuring sustainability of the biological diversity found within these areas. The TLMP was amended in 1986 to incorporate these changes, as well as incorporate the direction in the Regional Guide.

The Tongass Timber Reform Act of 1990 (TTRA) amended the ANILCA, providing for additional protection of fish-producing streams, establishing five new wildernesses, and establishing 12 "LUD II" areas, which are to be managed in an essentially unroaded, primitive state to preserve their primitive conditions. The TLMP was amended in 1991 to incorporate the direction contained in the TTRA.

The revision was completed, with the publication of the Record of Decision (ROD) for the Tongass Land and Resource Management Plan (Forest Plan) in 1997. The revised forest plan included 19 land use designations (LUDs) or allocations, as well as detailed Forest-wide standards and guidelines guiding the management of the Forest. Among the 19 land use designations allocated in the new Forest Plan were Old-growth Habitat, Special Interest Areas, and Remote and Semi-remote Recreation. These allocations are intended to preserve the ecological characteristics of the areas, and to promote biodiversity through maintaining a mixture of habitats, at a variety of spatial scales, that are capable of supporting naturally occurring flora, fauna, and ecological processes. In addition, there are 22 sets of Forest-wide standards and guidelines that provide direction for the management of the Tongass National Forest. These include standards and guidelines for the management of air, beach and estuary fringe, riparian areas, soil and water, wetlands, and threatened, endangered and sensitive species. Within Forest Plan the direction states that a midterm review ...

> *"will include an evaluation of the effectiveness of the plan's old growth strategy and riparian direction to conserve biodiversity and prevent the need to list species under the Endangered Species Act (ESA). The evaluation will be conducted in collaboration with the appropriate Federal and State Agencies. Any needed changes in the plan's direction will be incorporated through the amendment revision process."*

A new Record of Decision was issued in 1999 in response to numerous appeals of the 1997 Forest Plan decision. In addition to the areas previously identified for "low impact management," the 1999 ROD established 18 "areas of special interest" to be managed in a primitive condition. These areas were either in the Remote or Semi-remote LUDs.

During continued litigation of the 1997 Forest Plan decision, United States District Court for the District of Alaska ruled March 30, 2001 that vacated the 1999 Record of Decision. The court ruling returned the Tongass National Forest to the 1997 Forest Plan decision. The court-issued order was effective immediately.

In response to this order, a supplemental Environmental Impact Statement (SEIS) for the 1997 Tongass Land Management Plan revision was completed. The SEIS documents the analysis of management

alternatives, which evaluate and consider roadless areas within the Tongass National Forest for recommendation as potential wilderness. The Final SEIS includes 109 inventoried roadless areas. The 1997 Forest Plan is used as a baseline and serves as The No Action Alternative in the SEIS. The No Action Alternative was selected in the February 24, 2003 decision. The SEIS has updated Forest Plan analyses and will be reflected in the FY 2003 Monitoring and Evaluation report (USDA Forest Service 2003).

Montreal Process Criteria and Indicators

I. Conservation of Biological Diversity

Evaluation of biological diversity is achieved through examining ecological integrity. Ecological integrity is maintained through ecosystems diversity, species diversity, and genetic diversity at various spatial scales. Ecosystems diversity is evaluated in terms of vegetation types, vegetative structural classes, and protected areas, as well as habitat fragmentation/connectivity. Evaluation criteria for species and genetic diversity include the presence of selected and sensitive species/guilds, populations and reproductive success of indigenous species. Wilderness, National Monument, old-growth reserves, wild and scenic rivers, and Special Areas, as well as beach, estuary, and riparian buffers are maintained to protect rare, unique and representative species and features. This protection provides for both species and genetic diversity. Wildlife and fish species of special interest, including Management Indicator Species (MIS) and sensitive species, are monitored for population trends relative to habitat changes. The effect of fragmentation and connectivity on wildlife and fish species is determined by the relative locations of roads and harvest units to geomorphic and vegetative features. The presence of snags and in-stream coarse woody debris determine the effectiveness of the riparian buffer and stream channel condition on the maintenance of aquatic biological diversity.

1. Past

Past management activities were not necessarily designed to meet the objectives of this criteria. However, the vast area associated with the Tongass contributed heavily to the maintenance of the natural biodiversity; less than half of 1 percent of the total area has ever had any type of management activity. Management activities generally conformed to the applicable laws and regulations, but until the NFMA and the1979 TLMP, no formal Forest-wide consideration of maintaining or improving biodiversity occurred.

2. Present

Management activities since 1979 have been guided by the 1979 land management plan, the 1980 Regional Guide, the 1990 amendment incorporating the Tongass Timber Reform Act, and now the direction and standards and guidelines included in the 1997 Forest Plan ROD.

3. Desired Condition

See Table 1 below: WW, WM, NM, RA, SA, RM, MW, OG, SM, L2, WR, SR, RR, EF, SV, ML, TM

II. Maintenance of Productive Capacity of Forest Ecosystems

Productive capacity of forest ecosystems is achieved through maintaining ecosystem integrity and productivity of timber, and is evaluated in terms of the timbered land base, forest type and age class, annual timber removal, and presence of invasive species detrimental to forest conditions. Evaluation criteria for productive capacity include distribution and changes in the timber land base, mean annual increment for forest type and age class, rate and total area of forest land converted to non-forest cover, area/volume of annual periodic timber removal and area and severity of occurrence of exotic species detrimental to forest condition.

1. Past

The principle management activity that relates to this criterion is timber harvest; from the 1950's to the 1990's, the vast majority of timber harvest was associated with the long-term timber sales. The only silvicultural system applied was clear-cutting. Regeneration was almost entirely natural, and some precommercial thinning occurred. Major changes in timber sale planning began to come about in the 1970's with the passage of the NEPA and NFMA. Direction contained in the 1979 TLMP and Regional Guide changed both the ways of planning timber sales and the protection of other resources. Beginning in the 1980's more emphasis was put on thinning, and more thought given to future second growth forest management. The advent of the TTRA and the 1997 Forest Plan considerably changed the way the timber resource was managed. As stated above, considerably less than half of 1 percent is under any type of intensive management.

2. Present

Current management of the timber resource on the Tongass NF is dramatically different from even ten years ago. More emphasis is put on alternative silvicultural systems with an increasing emphasis on uneven-aged management, increased second growth management, consideration for non-timber resources, and coordination with other agencies and the public.

3. Desired Condition

See Table 1-1 below: RR, SV, ML, TM

III. Maintenance of Forest Ecosystem Health and Vitality

Ecosystem health and vitality is achieved through maintaining ecosystem integrity relative to selected physical and biologic indicators. Ecosystem health and vitality is evaluated in terms of principal ecological processes, effects of human activities, fire-water flow regimes, and invasion of noxious species. Evaluation criteria for ecosystem health and vitality include area and severity of insect attack and disease infestation, area of windthrow, area burned, and introduction of exotic species detrimental to forest condition, as well as the total area of forest land converted to non-forest land cover and uses, and the rate of conversion.

1. Past

Past management for forest health was primarily the salvage of windthrow or landslide/avalanche-damaged trees. Wind damage is far more prevalent in Southeast Alaska than fire; fire is not a consideration. Wind damage has occurred to both natural stands and buffers left along streams, between units; many of these areas were not treated because of access or low value. Landslides are another naturally occurring destructive force; salvage rarely occurred because of the potential for additional soil and watershed damage. Insect and disease damage was not generally of a concern because of the relatively small area affected. Some treatment of easily accessible stands has occurred, but usually endemic levels of insect and disease activity were allowed to run their course. Insects were generally weather controlled, and outbreaks short-lived. Decays have caused small-scale disturbances, but treatment of these stands usually occurred only where readily accessible.

2. Present

Management of forest health is little changed from the past. A major shift has been in the recognition of wind damage potential, and greater effort has been put into preventing wind damage caused by management activities. Although there has been a general increase in accessibility over the Forest, the increase in "no harvest" land use designations, the lessening emphasis on timber harvest, and the closing of existing roads will likely reduce access in the future. Nature events will be observed, but in all probability little insect- and disease-related management activity will occur.

3. Desired Condition

See Table 1-1 below: WW, WM, NM, RA, SA, RM, MW, OG, SM, L2, WR, SR, RR, EF, SV, ML, TM

IV. Conservation and Maintenance of Soil and Water Resources

Conservation and maintenance of soil and water resources is achieved through maintaining ecosystem integrity relative to estimates of historical ranges of variability of ecological conditions. Evaluation of the conservation and maintenance of soil and water resources includes the percentage of harvested area showing degraded soil quality, ecologically sensitive areas along buffer zones, and assessment of changes in the distribution and abundance of native aquatic fauna. Soil quality parameters monitored include compaction, displacement, erosion, accumulation of water in ponds, and loss of organic matter. Specific measurements include stream flow characteristics and acres by watershed condition, defined through hydrologic condition assessment.

1. Past

Past management activities, particularly timber harvest and road construction, have adversely affected the soil and water resource. Changes in thinking over the years have led to an improvement of these resources. The NEPA and NFMA legislated changes in the way business was done, and greater effort was put into protection and rehabilitation of the soil and water resources. The Regional Guide contained specific standards and guidelines for the protection of the watershed resources. The Clean Water Act mandated the use of Best Management Practices (BMP), which were incorporated into the timber sale contract, and applied to road construction as well as mining activities. The passage of the TTRA directly affected the aquatic resource on the Tongass through the mandated increase in the size of riparian buffers.

2. Present

Present management activities are heavily oriented toward the maintenance and improvement of the soil and water resources. The continuing use of the BMP's, the application of the Forest Plan standards and guidelines, the increased coordination with soil-and water-related agencies, and the increased use of watershed assessments have strongly contributed to a great reduction of adverse effects on the soil and water resources as a result of management activities. In addition, much more emphasis is placed on watershed restoration and rehabilitation.

3. Desired Condition

See Table 1-1 below: WW, WM, NM, RA, SA, RM, MW, OG, SM, L2, WR, SR, RR, EF, SV, ML, TM

V. Maintenance of Forest Contribution to Global Carbon Cycles

The maintenance of a Forest's contribution to the global carbon cycle is based on the total forest ecosystem biomass and carbon pool, by forest type, age class and forest stages of succession. This includes absorption and release of carbon, and the contribution of forest products to the total global budget.

Carbon cycle contributions by the Tongass National Forest are not evaluated in this report.

VI. Maintenance and Enhancement of Long-Term Multiple Socioeconomic Benefits

Maintenance and enhancement of long-term multiple socioeconomic benefits is achieved through maintaining a sustainable yield and production of goods and services, and maintenance of social values. Maintenance and enhancement of socioeconomic benefits are evaluated in terms of demographics, opportunities to provide socioeconomic benefits to communities, financial benefits to communities, financial and opportunity cost, as well as the presence of natural resources and capital investment. Specific aspects tracked include production and consumption, recreation and tourism, investment in the forest sector, cultural/social/spiritual needs/values, and employment and community needs. Criteria for evaluation of the maintenance and enhancement of long-term multiple socioeconomic benefits include area/volume of timber removed, expenditures by individuals on non-timber use, availability and use of recreational opportunities, funding for forest management and research, harvest revenues, protection of unique or significant aboriginal social, cultural or spiritual sites, employment of local populations in forest management, number of communities with a significant forestry component in the economic base, area of land available for subsistence opportunities, and providing potable water sources.

1. Past

The tourism industry was started early in Southeast Alaskan history. For example, the first cruise ships visited Hubbard Glacier, near Yakutat, in 1883 and grew dramatically in the early years of the twentieth century. A thriving industry was built around the commercial sale of contemporary Native Alaskan artifacts. Tourism has continued to grow ever since, and is intimately tied to the Tongass National Forest and the communities that call it home. The sheer presence of the forest is a major draw for tourists, ranging from cruise ships to hikers in the wilderness areas and users of Forest Service cabins. The fish, originating in the waters within and adjacent to the National Forest, are a significant attraction for tourists, creating a viable industry in charter boating. The boom in eco-tourism has increased the importance of tourism to the Southeast Alaska economics base.

Recreation opportunities have continued to grow, and are as varied as kayak trips, hiking, camping, hunting, birding, off-road travel, boating, use of snow mobiles, and camping at Forest Service facilities such as cabins, shelters, and developed recreation areas. The presence of the several wilderness areas attracts many people each year. Several businesses are based on both terrestrial and aquatic wildlife viewing, ranging from brown bears to birds to whales.

Commercial fishing has long been a feature of the economic base in Southeast Alaska. Many of the fish caught originated in the waters of the National Forest, or are present because of habitat enhancement programs on the Forest. There were many fish processors located throughout Southeast Alaska, with some very large canneries. These processors and canneries existed from the late 1800's to the present, although the numbers have diminished over the years. The numbers of commercial fishing boats operating in Southeast Alaska have increased over the years, with a dramatic increase over the last 10 years.

In the early years of the twentieth century, there were hopes for a pulp mill operation because of the suitability of the timber for making pulp. In 1920, a series of sales were studied; this led to two of the sales being offered in 1921. Ultimately, both failed, and a third company lost interest. The large cost of transport to available markets was the primary factor. Other pulp and saw timber sales made in the late 1920's failed because of the onset of the Great Depression. Most early saw mills were generally small and local in nature. Many of the same problems (cost of transport, lack of an infrastructure, and a lack of local markets) have persisted throughout the years.

The 1950's brought several long-term, large-scale timber sale pulpwood/saw og contracts, which were created to provide for the economic growth and community stability of Southeast Alaska. There were originally five contracts, which were eventually reduced to two. Ketchikan Pulp Company was formed by a combination of American Viscose and Puget Sound Pulp and Timber in 1948. A mill site was selected at Ward Cove near Ketchikan, and a 50-year contract was signed in 1951. A second pulp mill was built in Sitka by the Alaska Pulp Development Company, and went into operation in 1959. Timber harvesting was maintained at a relatively constant level until the early 1990's; it has since been greatly reduced through a variety of factors, including major changes in the management of the National Forest.

The long-term contract with Alaska Pulp Company was terminated in 1993. The other long-term contract with Ketchikan Pulp Corporation terminated in 1999. The mill closures brought about many social and economic effects in Southeast Alaska. Among these were reductions in property tax bases, reductions in school enrollments, and major shifts in the private sector employment, with tourism and fishing taking on a much larger role. While surveys show that the average wage has remained close to the same as before the mill closures, they also show that more people are required to work two jobs to maintain the same level of pay. A much larger percentage of the employment is in the service industries, and Federal, State and local governments.

2. Present

The present situation continues to place less emphasis on the consumptive use of forest products, such as timber and minerals extraction, and more on the fishing and tourism industries. The timber industry, at present, is in a slump; the possibility of further reductions in the Federal timber management program may reduce the industry to a position of only local effect and interest. The probability of timber once again becoming a "major player" in the overall socioeconomic environment in Southeast Alaska is considered low. Mining is becoming more important than it was just a few years ago; however, the economic effects are fairly localized. Greater emphasis is put in recreation, tourism, cultural uses of the land, and cooperative efforts to develop alternative uses of forest resources. A growing industry revolves around the culture of Native Alaskans.

3. Desired Condition

See Table 1-1 below: WW, WM, NM, RA, SA, RM, MW, OG, SM, L2, WR, SR, RR, EF, SV, ML, TM, MM, TUS

VII. Legal, Institutional and Economic Framework for Forest Conservation and Sustainable Management

Effectiveness of the legal, institutional and economic framework for forest conservation and sustainable management is determined through evaluation of the support toward conservation and sustainable management of the forest, economic policies and measures, capacity to measure and monitor changes in the conservation and sustainable management, and capacity to conduct and apply research/development focused on improving forest management and delivery of goods/services. Evaluation criteria for the application of the legal, institutional and economic framework for forest conservation and sustainable management include: access to forest resources, ownership, effectiveness of inter-institutional coordination on land use and forest management, performance accomplishment, effective monitoring and control system audits for management conformity with planning, harvest system prescriptions, mechanisms for sharing the economic benefits derived from forest management, relevance of policy and planning information, and status of inventories relative to updates.

1. Past

The legal framework for forest conservation and sustainable management is rooted in the very beginnings of the Forest Reserves. The Creative Act of 1891 withdrew the forest reserves from the public domain. The purpose of the forest reserves was to protect and manage the forest resources for sustained production of goods and services into the future. In 1897, the Organic Act established the national forests, and gave direction to "improve and protect" Federal forest lands.

Four key pieces of legislation guide the management of the Tongass National Forest and the sustainability of forest resources. The first is the Multiple Use-Sustained Yield Act of 1960. The MUSY affirmed the authority of the Forest Service to manage the national forests and grass lands for "outdoor recreation, range, timber, watershed, and wildlife and fish purposes." Through this act, Congress affirmed the philosophies and principles of sustainability to all the resources under the management and responsibility of the Forest Service.

The second is the National Environmental Policy Act of 1969 (NEPA), which was enacted to "promote efforts which will prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of man" and "enrich the understanding of ecological systems and natural resources." The NEPA directs that for all Federal actions that significantly affect the quality of the human environment, the environmental effects of the action are to be documented, and alternatives to proposals are to be displayed and evaluated.

The third key act is the Forest and Rangeland Renewable Resources Planning Act of 1974 (RPA). The RPA called for a five-year review of all Forest Service activities, based on an assessment of renewable resources completed every 10 years.

The RPA was amended with the National Forest Management Act of 1976 (NFMA), the fourth key law. The NFMA mandated the used of land management plans to guide the management of the national forests in a manner that provides for multiple use and sustained uses. The plans were to be developed and maintained through "integrated consideration of physical, biological, economic and other sciences."

Management of the Tongass was directly affected by passage of the Alaska National Interest Lands Conservation Act of 1980. The ANILCA increased the size of the Tongass NF, established 14 Wilderness Areas, and affirmed the establishment of two National Monuments. These wildernesses and monuments were established to preserve unique ecosystems, assuring sustainability of the biological diversity found within these areas. In addition, the ANILCA directs that, consistent with good management principles and conservation practices, activities on [federal] public lands in Alaska will be conducted to cause the least effect on the subsistence lifestyles of Alaskan rural residents. The Tongass Timber Reform Act of 1990 (TTRA) amended the ANILCA, providing for identification of lands unsuitable for timber management, increasing protection of fish-producing streams, establishing five new wildernesses, and establishing 12 "LUD II" areas, which are to be managed in an essentially unroaded state to preserve their primitive conditions.

Many other laws have been passed to protect, maintain or enhance all of the forest resources, including the social and cultural resources. These laws include:

Weeks Law of 1911 – authorized the purchase of lands within the watersheds of navigable streams;

Knutson-Vandenberg Act (1930) – authorized the collection of funds from timber sale receipts for the purpose of "protecting and improving the productivity of the renewable resources of the forest land … including sale area improvement, maintenance and construction, reforestation, and wildlife habitat management";

Clean Water Act of 1948, as amended – provides for a variety of measures to preserve water quality, including the mandate to develop Best Management Practices;

Wilderness Act of 1974 – established the national wilderness preservation system for the purpose of preserving relatively large tracts of land which appear unaffected by human activity, has outstanding opportunities for solitude or a primitive type of recreation, and may contain ecological, geological, or other features of scientific, educational, scenic, or historic value";

National Historic Preservation Act (1966) – required Federal agencies to take a bigger role in historic preservation programs and activities;

Wild and Scenic Rivers Act (1968) – declared that selected rivers which possess outstandingly remarkable scenic, recreational, geologic, fish and wildlife, historic, cultural or similar values be preserved in their free-flowing state;

Endangered Species Act of 1973 (ESA) – directed that Federal agencies "shall seek to conserve threatened and endangered species";

Archaeological Resources Protection Act of 1979 – directed Federal agencies to protect archaeological and cultural resources and sites on [federal] public lands;

Federal Cave Resources Act of 1988 – provides for protection of significant cave resources on Federal lands; and

Forest Stewardship Act of 1990 – established a grant program for the study of biology of forest organisms, ecosystems functions, and wood as a raw material, among others. Also provided increased service to rural communities through rural development programs.

In addition to the myriad of laws, other national direction comes from Executive Orders. Executive Orders of interest that address protection and maintenance of forest resources (such as natural, socioeconomic and cultural resources) include EO 11988 Floodplain Management (1977), EO 11990 Protection of Wetlands (1977), 12898 Environmental Justice (1994), EO 12962 Recreational Fisheries (1995), and EO 13186 Migratory Bird Protection (2000).

The various regulations, manuals, and handbooks provide the management philosophies, polices, principles, and direction for the implementation of the laws and Executive Orders.

2. Present

The present management is continue to follow all applicable laws, Executive Orders, and regulations in the management of the Tongass National Forest, and to continue to make adaptive changes to integrate old and new laws and regulations as they become effective.

3. Desired Condition

The legal framework for management of the forest resources of the Tongass National Forest applies across the full spectrum of resources. The Desired Conditions for all land use allocations are tied to this legal framework, and will conform to the applicable laws, regulations, policies, and direction.

Table 1-1. Relationship between Forest Plan Desired Conditions and Criteria Indicators

Desired Condition	Criteria Indicators						
	Conservation of Biological Diversity	Maintenance of Productive Capacity of Forest Ecosystems	Maintenance of Forest Ecosystem Health & Vitality	Conservation and Maintenance of Soil & Water Resources	Maintenance of Forest Contribution to Global Carbon Cycles	Maintenance & Enhancement of Long Term Multiple Socioeconomic Benefits	Legal, Institutional & Economic Framework for Forest Conservation & Sustainable Management
WW, WM - Wilderness, Wilderness National Monument Extensive, unmodified natural environments characterize all designated Wilderness on the Tongass National Forest. Ecological processes and natural conditions are not measurably affected by past or current human uses or activities. Users have the opportunity to experience independence, closeness to nature, solitude and remoteness, and may pursue activities requiring self-reliance, challenge and risk. Motorized and mechanized use is limited to the minimum needed for the administration of the wilderness, access to state and private lands, subsistence uses, and for public access and other uses specifically allowed by ANILCA. The purposes of National Monument designation are fulfilled by protecting and learning more about the special resources they contain. Appropriate research is encouraged and supported within the constraints of wilderness designation, and contributes to both the purposes of the Wilderness National Monuments and improved management of other forest lands. Appropriate interpretive and educational efforts allow the public to better understand the resources of these special areas and to appreciate how these areas fit into the local, regional, and even global context of geology, ecology, and human history. The Wilderness portions of Admiralty Island and Misty Fiords National Monuments have the same characteristics and desired conditions as other Wildernesses on the Forest.	X		X	X		X	

Desired Condition	Criteria Indicators						
	Conservation of Biological Diversity	Maintenance of Productive Capacity of Forest Ecosystems	Maintenance of Forest Ecosystem Health & Vitality	Conservation and Maintenance of Soil & Water Resources	Maintenance of Forest Contribution to Global Carbon Cycles	Maintenance & Enhancement of Long Term Multiple Socioeconomic Benefits	Legal, Institutional & Economic Framework for Forest Conservation & Sustainable Management
NW – Non-wilderness National Monument The purposes of the Non-wilderness National Monument designation is the same as that for the Wilderness. Ultimately, the entire Non-wilderness National Monument provides the same natural settings and recreation experiences as the adjacent Wilderness National Monument areas. However, activities, such as mining, are permitted that are not allowed in Wilderness. During mining operations, mining activities are localized and limited to the area necessary for their efficient and orderly development. Off-site effects to National Monument resources are minimal, and most Monument users are not aware of, or affected by, the mines. After the completion of mining, rehabilitation of the affected areas is done to minimize the evidence of past mining and to the maximum extent feasible, seek to return the area to generally natural conditions.	X		X	X		X	
RA - Research Natural Area All Research Natural Areas on the Tongass National Forest are characterized by essentially unmodified environments in which natural ecological processes prevail. They remain undisturbed by human uses or activities, and provide quality opportunities for non-manipulative scientific research, observation and study. The RNA network is representative of the predominant vegetation types, wildlife habitats, and aquatic communities of the Tongass. Research Natural Areas are used as monitoring reference areas to evaluate other lands where management activities are undertaken to assess the effectiveness of various standards, guidelines, and mitigation measures in reducing or preventing adverse environmental effects.	X		X	X		X	

Desired Condition	Criteria Indicators						
	Conservation of Biological Diversity	Maintenance of Productive Capacity of Forest Ecosystems	Maintenance of Forest Ecosystem Health & Vitality	Conservation and Maintenance of Soil & Water Resources	Maintenance of Forest Contribution to Global Carbon Cycles	Maintenance & Enhancement of Long Term Multiple Socioeconomic Benefits	Legal, Institutional & Economic Framework for Forest Conservation & Sustainable Management
SA - Special Interest Area All Special Interest Areas on the Tongass National Forest are characterized by generally unmodified environments in which unique natural features are preserved. They remain largely undisturbed by human uses or activities, except for localized interpretive purposes and, in some cases, recreation developments, and provide quality opportunities for public study, use, and enjoyment. Each is an example of one or more cultural, archaeological, geological, botanical, zoological, paleontological, or other special features unique within the Tongass.	X		X	X		X	
RM - Remote Recreation Areas in the Remote Recreation Land Use Designation are characterized by extensive, unmodified natural environments. Ecological processes and natural conditions are not noticeably affected by past or current human uses or activities. Users have the opportunity to experience independence, closeness to nature, solitude and remoteness, and may pursue activities requiring self-reliance in an environment that offers a high degree of challenge and risk. Interactions between users are infrequent. Motorized access is limited to traditional means: boats, aircraft and snowmobiles. Facilities and structures are minimal, and rustic in appearance.	X		X	X		X	
MW - Municipal Watershed Lands managed as Municipal Watersheds are generally in a natural condition. Facilities or structures to provide municipal water supplies may be present. Uses or activities that could adversely affect water quality or supply do not occur. These watersheds provide municipal water that meets all State Drinking Water Regulations and Water Quality Standards for water supply.	X		X	X		X	
OG - Old-growth Habitat All forested areas within this Land Use Designation have attained old-growth forest characteristics. A diversity of old-growth habitat types and associated species and subspecies and ecological processes are represented.	X		X	X		X	

Desired Condition	Criteria Indicators						
	Conservation of Biological Diversity	Maintenance of Productive Capacity of Forest Ecosystems	Maintenance of Forest Ecosystem Health & Vitality	Conservation and Maintenance of Soil & Water Resources	Maintenance of Forest Contribution to Global Carbon Cycles	Maintenance & Enhancement of Long Term Multiple Socioeconomic Benefits	Legal, Institutional & Economic Framework for Forest Conservation & Sustainable Management
SM - Semi-remote Recreation Areas in the Semi-remote Recreation Land Use Designation are characterized by generally unmodified natural environments. Ecological processes and natural conditions are only minimally affected by past or current human uses or activities. Users have the opportunity to experience a moderate degree of independence, closeness to nature, solitude and remoteness, with some areas offering motorized opportunities and others non-motorized opportunities (except for the traditional uses of boats, aircraft, and snow mobiles). Interactions between users are infrequent. Facilities and structures may be minimal or occasionally may be larger in scale, but will be rustic in appearance, or in harmony with the natural setting.	X		X	X		X	
L2 - Land Use Designation II Areas in this Land Use Designation are characterized by extensive, generally unmodified natural environments, and retain their wild character. Ecological processes and natural conditions are only minimally affected by past or current human uses or activities. Users have the opportunity to experience a high-to-moderate degree of independence, closeness to nature, solitude and remoteness and may pursue activities requiring self-reliance, challenge, and risk. Interactions between users are infrequent. Recreational facilities and structures are primitive.	X		X	X		X	
WR - Wild River Wild Rivers and river segments are in a natural, free-flowing, and undisturbed condition. Ecological processes and changes predominate. The outstandingly remarkable values for which the river was designated remain outstanding and remarkable. Recreation users have the opportunity for primitive and semi-primitive experiences, solitude and remoteness in a natural setting. Interactions between users are infrequent, and evidence of human activities is minimal. Facilities and structures are rustic in appearance and promote primitive recreation and tourism experiences.	X		X	X		X	

Desired Condition	Criteria Indicators						
	Conservation of Biological Diversity	Maintenance of Productive Capacity of Forest Ecosystems	Maintenance of Forest Ecosystem Health & Vitality	Conservation and Maintenance of Soil & Water Resources	Maintenance of Forest Contribution to Global Carbon Cycles	Maintenance & Enhancement of Long Term Multiple Socioeconomic Benefits	Legal, Institutional & Economic Framework for Forest Conservation & Sustainable Management
SR - Scenic River Scenic Rivers and river segments are in a generally unmodified, free-flowing condition. Ecological processes and changes may be somewhat affected by human uses. The outstandingly remarkable values for which the river was designated remain outstanding and remarkable. Recreation and tourism users have the opportunity for experiences ranging from Primitive to Roaded Natural in a natural-appearing setting. Resource activities within the river corridor are not visually evident to the casual observer. Interactions between users are moderate. Facilities and structures are rustic in appearance, and promote semi-primitive recreation experiences and/or public safety. A yield of timber may be produced which contributes to the Forest-wide sustained yield.	X	X	X	X		X	
RR - Recreational River Recreational Rivers and river segments are in a generally unmodified to modified, essentially free-flowing condition. Ecological processes and changes may be affected by human uses. The outstandingly remarkable values for which the river was designated remain outstanding and remarkable. Recreation users have the opportunity for a variety and range of experiences in a modified but pleasing setting. Resource activities and developments may be present within the river corridor, and may dominate some areas. A variety of visual conditions occur. Interactions between users may be moderate to high. A yield of timber may be produced which contributes to Forest-wide sustained yield.	X	X	X	X		X	
EF - Experimental Forest Each experimental forest is managed for the purposes for which it was established. Ongoing research provides useful needed information for forest management. Non-research types of activities and uses may be compatible, and do not interfere with, research or demonstration objectives. Opportunities for public use of roads may be present.	X		X	X		X	

Desired Condition	Criteria Indicators						
	Conservation of Biological Diversity	Maintenance of Productive Capacity of Forest Ecosystems	Maintenance of Forest Ecosystem Health & Vitality	Conservation and Maintenance of Soil & Water Resources	Maintenance of Forest Contribution to Global Carbon Cycles	Maintenance & Enhancement of Long Term Multiple Socioeconomic Benefits	Legal, Institutional & Economic Framework for Forest Conservation & Sustainable Management
SV - Scenic Viewshed In areas managed under the Scenic Viewshed Land Use Designation, forest visitors, those that recreate, and others using identified popular travel routes and use areas will view a natural-appearing landscape. Management activities in the foreground will not be evident to the casual observer. Activities in the middleground and background will be subordinate to the characteristic landscape. Areas topographically screened from Visual Priority Travel Routes and Use Areas may be heavily modified. Within these viewsheds, timber harvest units are typically small and affect only a small percentage of the seen area. At any given point in time, roads, facilities, and other structures are either not visually evident or are subordinate to the landscape. A variety of forest succession stages providing wildlife habitat occur, although late forest succession stages predominate. Recreation and tourism opportunities in a range of settings are available. In the areas managed for Retention or Partial Retention VQOs, timber yields will generally be obtained through the use of small openings or uneven-aged systems. A yield of timber is produced which contributes to Forest-wide sustained yield.	X	X	X	X		X	
ML - Modified Landscape In areas managed under the Modified Landscape Land Use Designation, forest visitors, those that recreate, and others using popular travel routes and use areas will view a somewhat modified landscape. Management activities in the visual foreground will be subordinate to the characteristic landscape, but may dominate the landscape in the middle and backgrounds. Within the foreground, timber harvest units are typically small and affect only a small percentage of the seen area at any one point in time. Roads, facilities, and other structures are also subordinate to the foreground landscape. Recreation opportunities associated with natural-appearing to modified settings are available. A variety of forest succession stages provide a range of wildlife habitat conditions. A yield of timber is produced which contributes to Forest-wide sustained yield.	X	X	X	X		X	

Desired Condition	Criteria Indicators						
	Conservation of Biological Diversity	Maintenance of Productive Capacity of Forest Ecosystems	Maintenance of Forest Ecosystem Health & Vitality	Conservation and Maintenance of Soil & Water Resources	Maintenance of Forest Contribution to Global Carbon Cycles	Maintenance & Enhancement of Long Term Multiple Socioeconomic Benefits	Legal, Institutional & Economic Framework for Forest Conservation & Sustainable Management
TM - Timber Production Suitable timber lands are managed for the production of saw timber and other wood products on an even-flow, Long-term Sustained Yield basis; the timber yield produced contributes to a Forest-wide sustained yield. An extensive road system provides access for timber management activities, recreation uses, hunting and fishing, and other public and administrative uses; some roads may be closed, either seasonally or year-long, to address resource concerns. Management activities will generally dominate most seen areas. Tree stands are healthy and in a balanced mix of age classes from young stands to trees of harvestable age, often in 40- to 100-acre stands. Recreation opportunities, associated with roaded settings from Semi-primitive to Roaded Modified, are available. A variety of wildlife habitats, predominantly in the early and middle forest succession stages, are present.	X	X	X	X		X	
MM - Minerals During mining operations, mining activities are limited to the area necessary for their efficient, economic, and orderly development. Mining is carried out so that any effects on other resources are minimized to the extent feasible, and all minimum legal resource protection requirements are met. Other resource uses and activities in the area do not conflict with mining operations. After the completion of mining, affected areas are rehabilitated and, in most cases, the area once again provides the settings and opportunities of the original Land Use Designation.		X				X	

Desired Condition	Criteria Indicators						
	Conservation of Biological Diversity	Maintenance of Productive Capacity of Forest Ecosystems	Maintenance of Forest Ecosystem Health & Vitality	Conservation and Maintenance of Soil & Water Resources	Maintenance of Forest Contribution to Global Carbon Cycles	Maintenance & Enhancement of Long Term Multiple Socioeconomic Benefits	Legal, Institutional & Economic Framework for Forest Conservation & Sustainable Management
TUS - Transportation & Utility System Transportation and Utility Systems have been constructed in an efficient and economic manner, and have been designed to be compatible with the adjacent Land Use Designation to the maximum extent feasible. The minimum land area consistent with an efficient, safe facility is used for their development. Effects on other resources have been recognized and resource protection has been provided. Other resources uses and activities in the area do not conflict with utility operations. State and Federal highways and reservoirs offer new developed recreation opportunities, as appropriate.							

The USDA Forest Service's Integrity and Accountability:

MISSION: To Sustain the Health, Diversity and Productivity of the Nation's

GOALS

Ecosystem Health

Promote ecosystem health and conservation using a collaborative approach to sustain the Nation's Forests, grasslands and watersheds.

Multiple Benefits to People

Provide a variety of uses, values, products and services for present and future generations by managing within the capability of sustainable ecosystems.

OBJECTIVES

Objective 1.a—Improve and protect watershed conditions to provide the water quality and quantity and the soil productivity necessary to support ecological functions and intended beneficial water uses.

Objective 1.b—Provide ecological conditions to sustain viable populations of native and desired nonnative species and to achieve objectives for Management Indicator Species (MIS)/focal species.

Objective 1.c—Increase the amount of forests and grasslands restored to or maintained in a healthy condition with reduced risk and damage from fires, insects and diseases, and invasive species.

Objective 2.a—Improve the capability of the Nation's forests and grasslands to provide diverse, high-quality outdoor recreation opportunities.

Objective 2.b—Improve the capability of wilderness and protected areas to sustain a desired range of benefits and values.

Objective 2.c—Improve the capability of the Nation's forests and grasslands to provide desired sustainable levels of uses, values, products, and services.

Objective 2.d—Increase accessibility to a diversity of people and members of underserved and low-income populations to the full range of uses, values, products, and services.

Objective 2.e—Improve delivery of services to urban communities.

Strategic Plan Framework

A Framework for Natural Resource Management

Forests and Grasslands to Meet the Needs of Present and Future Generations

GOALS

Scientific and Technical Assistance

Develop and use the best scientific information available to deliver technical and community assistance and to support ecological, economic, and social sustainability.

Effective Public Service

Ensure the acquisition and use of an appropriate corporate infrastructure to enable the efficient delivery of a variety of uses.

OBJECTIVES

Objective 3.a—Better assist in building the capacity of Tribal governments, rural communities, and private landowners to adapt to economic, environmental, and social change related to natural resources.

Objective 3.b—Increase the effectiveness of scientific, developmental, and technical information delivered to domestic and international interests.

Objective 3.c—Improve the knowledge base provided through research, inventory, and monitoring to enhance scientific understanding of ecosystems, including human uses, and to support decisionmaking and sustainable management of the Nation's forests and grasslands.

Objective 3.d—Broaden the participation of less traditional research groups in research and technical assistance programs.

Objective 4.a—Improve financial management to achieve fiscal accountability.

Objective 4.b—Improve the safety and economy of USDA Forest Service roads, trails, facilities, and operations and provide greater security for the public and employees.

Objective 4.c—Improve and integrate informational systems, data structures, and information management processes to support cost-efficient program delivery.

Objective 4.d—Improve the skills, diversity, and productivity of the workforce.

Objective 4.e—Ensure equal opportunity in employment practices.

Objective 4.f—Provide appropriate access to National Forest System lands and ensure nondiscrimination in the delivery of all USDA Forest Service programs.

Table 1-2. Tongass Monitoring Questions/ USDA Forest Service Strategic Goals Crosswalk

Tongass Monitoring Questions	Goal 1: Ecosystem Health	Goal 2: Multiple Benefits to People	Goal 3: Scientific and Technical Assistance	Goal 4: Effective Public Service
Air Quality				
Is air quality meeting State and Federal ambient air quality standards?	X			
Biodiversity				
Are contiguous blocks of old growth habitat being maintained in a forest-wide system of old growth reserves to support viable and well distributed populations of old growth associated species and subspecies?	X			
Are the effects on biodiversity consistent with those estimated in the Forest Plan?	X			
Are management practices consistent with current knowledge regarding sensitive species conservation (federally listed threatened or endangered species, Alaska Region sensitive species, and State species of special concern)?	X			
Are destructive insect and disease organisms increasing to potentially damaging levels following management activities?	X			
Fish Habitat				
Are population trends for Management Indicator Species (MIS) and their relationship to habitat changes consistent with expectations?	X			
Are fish & riparian standards and guidelines being implemented?	X			
Are fish & riparian standards and guidelines effective in maintaining or improving fish habitat?	X			
Heritage Resources				
Are heritage resources standards and guidelines being implemented?		X		
Are heritage resources standards and guidelines effective in protecting heritage/cultural resources as expected in the Forest Plan?		X		
Karst and Caves				
Are karst and cave standards and guidelines being implemented?	X			
Are karst and cave standards and guidelines effective in protecting the integrity	X			

Tongass Monitoring Questions	Goal 1: Ecosystem Health	Goal 2: Multiple Benefits to People	Goal 3: Scientific and Technical Assistance	Goal 4: Effective Public Service
of significant caves and the karst landscape?				
Land Management Planning				
Is the management of National Forest System lands consistent with management objectives of adjacent lands and their management plans?		X		
Local and Regional Economies				
Are the effects on employment and income similar to those estimated in the Forest Plan?		X		
Has the Forest Service worked with local communities to identify and pursue Rural Community Assistance opportunities?			X	
Minerals and Geology				
Are the effects of mining activities on surface resources consistent with Forest Plan expectations, as allowed in approved Plans of Operations?	X			
Recreation and Tourism				
Are areas of the Forest being managed in accordance with the prescribed Recreation Opportunity Spectrum (ROS) class in Forest-wide standards and guidelines?		X		
Is Off Road Vehicle (ORV) use causing, or will it cause, considerable adverse effects on soil, water, vegetation, fish and wildlife, visitors or cultural and historic resources of the Forest?	X			
Research				
Have identified high-priority information needs been fulfilled?			X	
Scenery				
Are the standards and guidelines effective in attaining the adopted Visual Quality Objectives established in the Plan?		X		
Soil and Water				
Are the standards and guidelines for soil disturbance being implemented?	X			

Tongass Monitoring Questions	Goal 1: Ecosystem Health	Goal 2: Multiple Benefits to People	Goal 3: Scientific and Technical Assistance	Goal 4: Effective Public Service
Are the standards and guidelines effective in meeting Alaska Regional Soil Quality Standards?	X			
Are Best Management Practices being implemented?	X			
Are Best Management Practices effective in meeting water quality standards?	X			
Subsistence				
Are the effects of management activities on subsistence users in rural Southeast Alaska communities consistent with those estimated in the Forest Plan?		X		
Timber				
Are timber harvest activities adhering to applicable timber management standards and guidelines?		X		
Are harvested Forest lands restocked within five years following harvest?		X		
Is the Allowable Sale Quantity (ASQ) consistent with resource information and programmed harvest?		X		
Are the Non-Interchangeable Components (NIC) of the allowable sale quantity consistent with actual harvest?		X		
Is the proportional mix of volume in NIC I and NIC II as estimated in the Forest Plan accurate?		X		
Should maximum size limits for harvested areas be continued?		X		
Transportation				
Are the standards and guidelines used for forest development roads and Log Transfer Facilities effective in limiting the environmental effects to anticipated levels?	X			
Wetlands				
Are wetlands standards and guidelines being implemented?	X			
Are wetlands standards and guidelines effective in minimizing the impacts to wetlands and their associated functions and values?	X			
Wild and Scenic Rivers				

Tongass Monitoring Questions	Goal 1: Ecosystem Health	Goal 2: Multiple Benefits to People	Goal 3: Scientific and Technical Assistance	Goal 4: Effective Public Service
Are Wild, Scenic, and Recreational River standards and guidelines being implemented?		X		
Are Wild, Scenic, and Recreational River standards effective in maintaining or enhancing the free flowing conditions and outstandingly remarkable values at the classification level for which the river was found suitable for designation as part of the National Wild and Scenic River System?		X		
Wilderness Areas				
Are standards and guidelines for the management of wilderness being implemented?		X		
Are standards and guidelines for the management of wilderness effective in maintaining the wilderness resource?		X		
Wildlife				
Are population trends for Management Indicator Species (MIS) and their relationship to habitat changes consistent with expectations?	X			
Are the population levels and associated distribution of mammalian endemic species on islands and portions of the mainland consistent with the estimates in the Forest Plan?	X			
Costs and Outputs				
What outputs were produced in the previous year?		X		
Are the costs associated with carrying out the planned management prescriptions (including those of producing outputs) consistent with those costs estimated in Plan?				X

Chapter 2

Monitoring Results and Evaluations

CHAPTER 2, MONITORING RESULTS AND EVALUATIONS

Air Quality

Goal: Maintain the current air resource condition to protect the Forest's ecosystems from on- and off-Forest air emissions sources.

Objective: Attain national and state ambient air quality standards Forest-wide.

Background: The Forest Plan anticipated localized, temporary, and limited direct effects on air quality from forest management activities within the Tongass National Forest such as dust, vehicle and small boat emissions, permitted incinerators, mineral development, and prescribed fire. Indirect effects were anticipated from off-Forest sources such as large cruise ship emissions, pulp mill emissions, and firewood burning. There are no Class I air sheds within or adjacent to the Tongass National Forest[1].

From 1989-1992 eighty permanent baseline plots were established across the Tongass National Forest for the use of lichens as biomonitors for air quality. A pilot effort to evaluate effects of a pulp mill was conducted near Sitka (Geiser, Derr, and Dillman, 1994).

Juneau's Mendenhall Valley is the only area in Southeast Alaska that is known to have exceeded national ambient air quality standards. This area, including about 5000 acres of Tongass National Forest, was designated a non-attainment area for particulate matter due to wood smoke and road dust in the early 1990s.

The Clean Air Act established regulatory authority for air quality within the Environmental Protection Agency (EPA) and Alaska Department of Environmental Conservation (ADEC). ADEC's monitoring strategy is to focus its limited resources on the highest priority areas and pollutants (i.e., areas and pollutants most likely to exceed a public health standard). For Southeast Alaska, ADEC has focused its efforts on monitoring particulate matter in Juneau's Mendenhall Valley. The Forest Plan concluded that EPA and ADEC enforcement of applicable regulations would ensure compliance with air quality standards.

Question 1: Is air quality meeting state and federal ambient air quality standards?

Since 1998, the Forest Service has reported an annual summary of ambient air quality monitoring data collected by ADEC in the vicinity of the Tongass National Forest. These data are available to the public on the Internet at http://www.epa.gov/air/data/.

Monitoring Results (2002)

During 2002, ADEC analyzed the content of particulate matter in air in Juneau's Mendenhall Valley. There were no exceedances of state or federal ambient air quality standards.

ADEC and an independent contractor also monitor visible smokestack emissions (opacity) from large cruise ships in the vicinity of Juneau. While there were 11 opacity violations reported in 2001, none were reported through the end of August 2002 (ADEC, 2002).

Evaluation of Results (2002)

The 2002 data indicate that air quality in Juneau is meeting state and federal ambient air quality standards. We recommend no corrective action with respect to air quality on the Tongass National Forest at this time.

Evaluation of Results

ADEC has continuously analyzed the content of particulate matter in air in Juneau's Mendenhall Valley since before 1997. Intermittent data have also been collected in Ketchikan and from other sites in Juneau since 1997. No state or federal ambient air quality standards have been exceeded since 1997. The last time particulate matter standards were exceeded in Juneau was in 1993.

[1] The most stringent air quality standards apply to Class I areas, which are usually large national parks and other areas where values related to air quality are considered inherently important attributes of the area.

No corrective action is recommended with respect to maintaining current air resource conditions on the Tongass National Forest. The following specific actions are recommended for consideration with respect to this monitoring question.

1. Eliminate this monitoring question as a "stand-alone" resource area in the Forest Plan monitoring program. Incorporate air quality monitoring activities into Wilderness monitoring at the Forest Plan scale, and/or project or program monitoring below or above the Forest Plan scale as appropriate.
2. Reconsider the use of the ADEC air quality-monitoring network as an annual, sole source of evaluation criteria for achieving state and federal ambient air quality standards across the Tongass National Forest. Consider resuming use of lichen biomonitors or other monitoring techniques more appropriate to the desired scale and objectives of monitoring air quality.

Biodiversity

Goal: Maintain healthy forest ecosystems; maintain a mix of habitats at different spatial scales (i.e., site, watershed, island, province, and forest) capable of supporting the full range of naturally occurring flora, fauna, and ecological processes native to Southeast Alaska.

Objective: Maintain a Forest-wide system of old-growth forest habitat (includes reserves, non-development land use designations, and beach, estuary and riparian corridors) to sustain old-growth-associated species and resources. Ensure that the reserve system meets the minimum size, spacing, and composition criteria described in Appendix K of the Forest Plan. Provide sufficient habitat to preclude the need for listing species under the Endangered Species Act due to habitat conditions on National Forest System lands.

Background: Two coarse-filter approaches are used here to monitor Forest biodiversity. The first focuses on the spatial distribution and composition of old-growth reserves (OGRs) and the cumulative harvest of old-growth timber by Biogeographical Province. The second examines emerging information concerning sensitive species conservation on the Forest.

Biodiversity Question 1: Are contiguous blocks of old-growth habitat being maintained in a Forest-wide system of old-growth reserves to support viable and well-distributed populations of old-growth-associated species and subspecies?

The Supplemental Environmental Impact Statement (SEIS) provides a graphical illustration of the distribution of old growth relative to production (2003, Figure 3.2-3).

The effects of management activities on the Tongass old-growth conservation strategy were determined by reviewing project-level environmental documents and Forest Plan amendments for their effects on the spatial distribution, size, and composition of old-growth habitat reserves. This is consistent with the Biodiversity Evaluation Criteria and Sampling Methods listed in the Forest Plan. In the past, this data was summarized by examining the changes by 1) bio-geographic provinces and 2) old growth land use designations (Table 2-3). This year, the changes were also summarized by 3) ecological subsections (Table 2-2), and by 4) spatial assessments. Each of these is reviewed below.

1) Biogeographic Provinces

The Interagency Viable Population Committee (VPOP) developed a landscape conservation strategy to provide old growth habitat to support well-distributed, viable populations old-growth associated wildlife species across the Tongass National Forest (Suring et al. 1993). Because of the comprehensive nature of the VPOP approach and supportive technical reviews of the strategy (Marcot 1992; Kiester and Eckhardt 1994), the system of VPOP large and medium habitat reserves was integrated into the Revised Forest Plan as the cornerstone of the old-growth habitat reserve strategy. The Forest Plan record provides an evaluation of how well the Tongass old-growth reserve system meets VPOP recommendations (Iverson 1997). The record found that some Forest Plan reserves exceeded the minimum amount recommended by the VPOP strategy by over 100%. Of particular interest were the five biological provinces identified by VPOP as having a higher risk of not maintaining viable populations of wildlife (Table 2-1). The Forest Plan requires that small old growth reserves (OGRs) be re-evaluated at the project level to determine whether adjustments are needed.

Table 2-1. Percentage that Higher Risk Biological Provinces Exceed the Minimum VPOP Productive Old Growth Recommendations*

Higher Risk Biological Provinces (higher risk relative to maintaining viable populations)	Percent Exceed Minimum VPOP Recommendations
North Prince of Wales	51%
Kupreanof/Mitkof Island	33%
Etolin Island and Vicinity	43%
Eastern Chichagof Island	73%
Revilla Island/Cleveland Peninsula	108%

*Table 3-2.14 (SEIS, 2003) updates this table and shows percent harvested

These higher risk provinces exceed the minimum VPOP POG recommendations by 33% to 108%. These and other analyses at the time concluded that the strategy was sufficient. One Non-significant Amendment to the Forest Plan incorporates changes to small old growth reserves in FY 2002.

2) Old Growth Land Use Designations

Old growth habitat also includes beach, estuary, and riparian corridors in development LUDs. Mostly natural areas can have some development, but it is very limited. Old growth habitat covers a much larger portion of the Tongass than the developable areas. The old growth reserves are only part of the old growth habitat. They were established to supplement the other old growth habitat.

Refer to Table 2-5 for a summary of the acreage changes in the OGR LUDs under the Forest Plan. Projects since 1997 that incorporated non-significant amendments to the Forest Plan, to modify small OGRs, allocated approximately 65,775 acres to the old growth LUDs. The Forest Plan's Appendix K would require 52,050 acres.

As directed by the Forest Plan, small OGRs are systematically reviewed as part of individual timber sale plans. Since the signing of the Forest Plan ROD in May 1997, sixteen project-level plans have changed the size or composition of old growth reserves. These changes are summarized in Table 2-4.

Amendments to the Forest Plan have resulted in an increase of 11,864 acres including 6,536 acres of productive old growth (POG) within the Old-growth Habitat LUD. Old-growth habitat reserves modified in these RODs meet or exceed size and productive old-growth minimums (Appendix K, Forest Plan).

In the resolution of an appeal of the Crystal Creek FEIS (#99-10-00-0006-A15), the Forest Service agreed to display the effects of OGR modifications on the suitable available timber in the biodiversity section of the annual Forest Plan Monitoring Report. These changes are displayed in Table 2-3. Forest-wide, these modifications of OGRs have reduced the timber acres suitable for timber harvest by 3,085 acres.

3) Ecological Sub-Sections

The 2001 monitoring report also recommended that old growth habitat be tied in with the ecological subsections (Nowacki et al, 2001) and coarse canopy forest (Caouette et al, 2000). For old growth habitat in the ecological subsections, see the following table.

Table 2-2. 1997 Forest Plan Management Percentages for 73 Ecological Subsections and Percent of Acres, 1997 Forest Plan Record of Decision by Ecological Subsection*

Ecological Subsections	Wilderness & National Monument	Mostly Natural Setting	Moderate Develop.	Intensive Develop.	Private	% Prod Forest[1]	Acres Prod Forest	% Non Prod Forest	% Non Forest	% Prod. Forest Harvested
Affleck Canal Till Lowlands	37	62	0	0	0	49	27,108	49	2	0.14
Alvin Bay Sediments	53	24	14	9	0	72	58,364	26	2	1.84
Behm Canal Complex	65	18	2	14	1	40	93,756	41	19	4.18
Bell Island Granitics	14	65	9	11	0	43	142,121	39	18	2.49
Boca De Quadra Complex	100	0	0	0	0	45	57,369	53	2	0.00
Boundary Ranges Icefields	32	62	2	3	0	7	634,925	9	84	1.67
Cape Fanshaw Complex	0	30	28	38	4	67	45,530	27	5	0.79
Central Baranof Metasediments	20	65	2	10	2	15	53,713	20	64	10.67
Central POW Till Lowlands	0	45	19	28	7	60	146,225	29	11	23.15
Central POW Volcanics	8	21	21	34	15	54	268,219	30	16	26.41
Chilkat Complex	0	96	0	0	4	22	139,231	31	47	**
Chilkat Peninsula Carbonates	26	52	13	7	2	28	151,009	18	54	5.48
Clarence Strait Volcanics	15	34	5	7	40	34	87,289	24	41	1.42
Dall-Outside Complex	0	59	9	3	29	47	135,112	21	33	0.97
Duke Island Till Lowlands	0	73	0	0	27	13	8,300	54	34	2.96
Duncan Canal Till Lowlands	6	35	13	46	1	36	87,819	52	13	7.74
Eastern Passage Complex	23	32	30	14	2	47	114,523	29	23	1.59
Elevenmile Till Lowlands	0	52	0	39	8	32	15,318	48	19	0.26
Etolin Granitics	37	19	26	19	0	38	33,710	44	19	5.44
Foggy Bay Till Lowlands	100	0	0	0	0	37	20,697	59	5	0.00
Freshwater Bay Carbonates	0	30	3	55	12	58	151,447	17	25	14.55
Gulf of Esquibel Till Lowlands	12	88	0	0	0	32	14,497	66	2	0.14
Hetta Inlet Metasediments	1	23	8	32	35	47	106,716	21	31	13.72
Holkham Bay Complex	32	26	12	30	0	57	290,378	21	22	0.09
Hood-Gambier Bay Carbonates	98	0	0	1	0	68	148,901	23	9	0.00
Kake Volcanics	0	23	5	34	39	37	49,382	34	28	15.42
Kasaan Peninsula Volcanics	0	28	11	0	61	20	7,128	17	63	0.85
Ketchikan Mafics/Ultramafics	0	51	10	21	18	34	23,449	30	36	6.06
Klawock Inlet Till Lowlands	0	4	0	0	96	13	1,950	2	86	62.00
Kook Lake Carbonates	0	39	6	55	0	66	67,364	19	15	17.38
Kuiu-POW Granitics	19	58	3	20	0	59	86,947	25	15	5.75
Misty Fiords Granitics	96	2	0	1	0	27	581,088	34	38	0.35
Mitchell-Hasselborg Till Lowlands	95	4	0	1	0	71	66,270	23	7	0.00
Moira Sound Complex	24	34	0	41	2	49	5,554	39	13	0.17
Mount Edgecumbe Volcanics	0	75	21	3	0	38	27,736	39	22	13.51
Necker Bay Granitics	83	16	0	0	0	22	40,710	35	42	0.34
North Admiralty Complex	84	7	2	6	0	48	150,357	22	31	0.00
North Baranof Complex	0	36	4	60	0	52	66,799	30	18	15.26
North Chichagof Granitics	19	51	2	28	1	25	100,374	27	47	2.97
North POW Complex	0	46	16	37	0	63	51,011	32	5	14.13
North POW-Kuiu Carbonates	0	28	7	56	10	81	203,532	11	8	40.84
Outer Coast Wave-cut Terraces	77	19	0	0	4	32	36,934	51	17	0.00

Table 2-2 (cont.). 1997 Forest Plan Management Percentages for 73 Ecological Subsections and Percent of Acres, 1997 Forest Plan Record of Decision by Ecological Subsection*

Ecological Subsections	Wilderness & National Monument	Mostly Natural Setting	Moderate Develop.	Intensive Develop.	Private	% Prod Forest[1]	Acres Prod Forest	% Non Prod Forest	% Non Forest	% Prod. Forest Harvested
Outer Islands Complex	100	0	0	0	0	68	22,282	25	7	0.00
Peril Strait Granitics	0	40	9	51	0	49	114,046	29	23	9.80
Point Adolphus Carbonates	0	32	0	67	1	57	66,873	20	23	3.71
Princess Bay Volcanics	62	10	8	20	0	57	31,670	37	6	12.95
Puget Peninsula Metasediments	100	0	0	0	0	12	11,996	4	83	0.00
Rowan Sediments	27	27	0	46	1	86	112,078	11	2	13.62
Sitka Sound Complex	0	68	9	15	7	49	91,053	36	15	9.15
Skowl Arm Till Lowlands	0	28	2	47	22	31	27,264	46	23	14.28
Soda Bay Till Lowlands	0	44	5	25	25	31	46,004	38	31	4.17
South Admiralty Volcanics	100	0	0	0	0	56	104,934	29	15	0.00
South Baranof Sediments	31	69	0	0	0	21	35,454	26	53	0.00
South POW Granitics	39	48	0	12	1	35	48,574	56	8	0.08
Stephens Passage Glaciomarine Terraces	36	39	11	8	7	61	172,630	32	8	0.08
Stephens Passage Volcanics	58	28	0	13	2	62	58,767	26	12	0.03
Stikine River Delta	77	5	15	0	3	57	24,034	13	30	15.87
Stikine Strait Complex	0	42	29	29	0	52	33,245	44	5	8.35
Stikine-Taku River Valleys	44	53	0	3	0	46	244,134	15	39	0.00
Sumner Strait Volcanics	0	32	7	61	0	48	172,326	48	4	6.45
Thayer Lake Granitics	100	0	0	0	0	65	46,677	25	10	0.00
Thomas Bay Outwash Plains	0	27	61	0	12	45	13,835	34	21	30.96
Thorne Arm Granitics	19	38	12	31	1	48	30,277	48	4	8.86
Traitors Cove Metasediments	0	36	21	32	11	55	176,470	31	14	13.63
Ushk-Patterson Bay Granitics	18	49	4	29	0	40	45,946	40	20	4.72
Vixen Inlet Till Lowlands	0	41	6	54	0	39	10,718	52	9	0.00
West Chichagof Complex	93	6	0	1	0	22	29,318	40	37	0.00
Wrangell Narrows Metasediments	11	19	34	26	11	54	169,149	32	14	13.54
Yakutat-Lituya Forelands	9	71	11	6	2	49	577,166	17	34	**
Zimovia Strait Complex	5	24	34	30	7	51	112,978	40	9	9.26

[1] Productive Forest is capable of producing at least 20 cubic feet of wood fiber per acre per year, or having greater than 8,000 board feet per acre.
* Figures are rounded and totals will therefore not equal 100%
**Only partially on the Tongass National Forest

The preceding table is based on the 2003 SEIS to the Forest Plan. The productive forest in 11 ecological subsections is 100% old growth habitat. Most of these ecological subsections contain over half old growth habitat. Only 17 subsections contain developed land use designations (LUDs). As reflected in the table above, the Tongass is well represented in wilderness, National Monuments, and natural setting LUDs.

4) Spatial Analyses

The 2001 monitoring report recommended that a detailed analysis be done of the old growth reserves (OGRs) with special emphasis on the composition and spacing of the OGRs. Due to time constraints this was deferred to 2003. The Forest-wide system of old growth habitat consists of non-development LUDs and can be summarized in the following table:

Table 2-3. Land Use Designations[1] From the 1997 Forest Plan

Non-development LUDs (13,428,299 acres)		Development LUDs (3,866,036)	
Wilderness and National Monument (5,885,387 acres)	**Mostly Natural (7,542,912 acres)**	**Moderate Development (1,119,000 acres)**	**Intensive Development (2,747,036 acres)**
Wilderness National Monument Wilderness National Monument	LUD II, Old-growth Habitat (Reserve) Research Natural Area Remote Recreation Semi-Remote Recreation Municipal Watershed Special Interest Area Wild River Scenic River Recreational River Experimental Forests	Scenic Viewshed Modified Landscape	Timber Production Minerals Transportation and Utility Systems

[1] In this table, the total area within each LUD is included. However, in some cases, more than one Land Use Designation can be appointed to the same area (such as Special Interest Area within Wilderness). Therefore, totaling the acres of the LUDs will exceed the total National Forest Acreage. No acreage has been calculated for the Transportation and Utility Systems LUD (USDA Forest Service 1997).

Evaluation of Results

Since May 1997, project level decisions have generally increased the size and improved composition of Old-growth Reserves.

Recommendations:

1) Continue detailed descriptions of changes in OGRs and associated rationale in project-level NEPA documents.

2) Develop procedures within the GIS to make it easier to track changes in OGRs.
   a) Track all non-development LUDs within the boundary of the OGR.
   b) Code OGR by size (large, medium, and small).
   c) Include the size and composition of the OGRs before and after the changes in the NEPA documents.
   d) In the FY2003 Annual Monitoring Report provide a summary of the rationale used to modify small OGRs over the past 5 years.

Table 2-4. Summary of Acreage Changes in the Old-growth LUDs documented in Project-level NEPA RODs From FY 1998 through September, 2002[3]

Project FY ROD Signed	VCU	OGR Acres *(POG)* on 5/97	Guideline OGR Acres *(POG)*[1]	Modified OGR Acres *(POG)*	Net Change OGR Acres *(POG)*	Net Change Suitable Acres [4&6]	Comments
Canal Hoya 1998	5200	2,090 *(1,630)*	2,901 *(1,450)*	9,210 *(2,740)*	7,120 *(1,110)*	-151	1) Expanded to meet size requirement
Chasina 1998	6800	1,525 (537)[2]	637 (318)	2,202 (842)	677 (305)	-78	1) Too small due to private lands 2) Expanded to meet size requirement
Control Lake 1998	5972 5971	5,073 *(2,418)*[2]	3,404 *(1,702)*	4,596 *(2,359)*[2]	-477 *(-59)*	+304	1) Remove 2nd growth 2) Improve connectivity 3) Includes small part of 5980
Crystal Cr. (Delta Cr.) 1998	487	2,800 *(1,680)*	3,195 *(1,598)*	4,100 *(2,340)*	1,300 *(660)*	+6	1) Include goat range 2) Maintain corridor along Paterson R. 3) Reduce 2nd growth
Crystal Cr. (Brown Cove) 1998	489[5]	4,650 *(2,550)*	6,444 *(3,222)*	4,840 *(2,640)*	190 *(90)*	-372	1) Add goat range 2) Improve connectivity 3) Brown Cove in same VCU
Crystal Cr. (Pt Agassiz) 1998[6]	489	2,350 *(1,260)*	Part of Brown Cove	2,270 *(1,400)*	-80 *(140)*	-306	1) Reduce beach and riparian buffers 2) Add high volume stands
Todahl Backline 1998	443	1,557 *(687)*	2,106 *(1,598)*	2,159 *(1,090)*	602 *(403)*	-361	1) Meet POG requirements
Niblack EA 1998	6830	583 *(344)*	1,414 *(707)*	1,499 *(828)*	916 *(484)*	+252	1) Meet POG requirements
Nemo Loop Thoms Lake 1998	479	12,203 *(7,157)*	10,000 *(5,000)*	12,430 *(7,917)*	227 *(760)*	-755	1) Fixed mapping error to allow road corridor 2) Improve connectivity
Sea Level 1999	756	1,160 *(800)*	1,308 *(654)*	1,395 *(716)*	235 *(-84)*	-315	1) Meet size requirement 2) Improve connectivity
Kuakan Timber Sale 2000	525	1,141 *(931)*	1,526 *(763)*	1,564 *(999)*	+423 *(+68)*	-126	1) Meet size requirement 2) Improve location
Doughnut Timber Sale 2000	476 477	2,001 *(1,560)*	3,090 *(1,540)*	3,090 *(1,620)*	+1,089 *(+60)*	-19	1) Meet size requirement
Polk Small Sales 2000	620	3,788 *(1,963)*	3,759 *(1,879)*	3,808 *(2,057)*	+20 *(+94)*	-153	1) Better placement
Luck Lake 2000	581 582 583	5,984 *(2,884)*	5,874 *(3,015)*	6,156 *(3,841)*	+172 *(+957)*	-537	1) Meet size requirement 2) Improve location
Salty EA 2000	747	2,576 *(1,821)*	2,546 *(1,273)*	2,603 *(1,871)*	+27 *(+50)*	-27	1) Meet size requirement 2) Improve connectivity
Fire Cove Salvage 2002	739	3,650 *(2,194)*	3,846 *(1,923)*	3,853 *(2,692)*	+203 *(+1498)*	-447	1) Meet size requirement 2) Improve location
Total	**N/A**	**53,131** ***(30,416)***	**52,050** ***(26,642)***	**65,775** ***(35,952)***	**12,644** ***(5,336)***	**-3,085**	

1) Required acreage (Appendix K, Forest Plan 1997).
2) Numbers not found in environmental document. It was determined by subsequent GIS analysis for this report.
3) All numbers are in acres except VCU; POG = volume strata H, M, L; OGR = Old-growth reserve.
4) Suitable acres are those that are suitable for timber harvest.
5) VCU 489 has two small OGRs (Pt Agassiz and Brown Cove), when combined they exceed guideline acres for VCU 489.
6) Required to be reported here as part of the resolution of an appeal on the Crystal Creek FEIS (#99-10-00-0006-A15).

Biodiversity Question 2: Are the effects on biodiversity consistent with those estimated in the Forest Plan?

Monitoring Results

The biodiversity/viability analyses in the Forest Plan assumed that the maximum level of timber harvest allowed by the Plan would be harvested and that the amount and intensity of timber harvest is an index of potential effects on biodiversity (Table 2-2). This is a "coarse filter" approach, not a "fine filter" analysis designed to address single species issues (Hunter 1990). Therefore for this analysis, if the actual amount or the intensity of harvested were less than assumed in the Forest Plan FEIS then the potential effects on biodiversity would be favorable. In actuality, less than half the ASQ was harvested from 1997 through 2002. These harvest units were placed into GIS and summarized by province and volume strata. During these years, 16,472 acres of productive old growth (POG) were treated by some type of timber harvest method (clearcut, clearcut with reserves, or partial cutting). Of these acres, 7926 acres were in the "high" volume stratum (Julin and Caouette 1997). These data are summarized by ecological subsection in Table 2-2.

To date, the high volume stratum has been harvested disproportionately to its abundance. In the 1997 ROD about 42 percent of the forest is in the high volume stratum, whereas about 48 percent of the harvest has been in the high volume stratum.

About 13 percent of the harvest has been a type of partial harvest resulting in uneven-aged or two-aged stands, thereby retaining higher levels of biological legacy within units (Table 2-6). The majority of harvest reported to date was planned under the 1979 TLMP. As timber sales planned under the 1997 Forest Plan are harvested, the amount of clearcut harvest is expected to decline. Review of the silvicultural prescriptions in 2001 showed prescriptions other than even-aged management on 61 percent of the timber units studied. Partial harvest methods, depending on how they are designed, can allow for higher habitat values levels than even-aged management (Kirchhoff and Thomson 1998; Price et al. 1998; Zenner 2000; Deal 2001; Deal and Tappeiner 2001; Kramer et al. 2001).

Table 2-5. Description of Timber Harvest (1998-2002) by Silvicultural System

Silvicultural system	% of Acres
Even-aged	87.0
Uneven-aged	12.3
Two-aged	.5
Intermediate	.2
Total	**16,472 acres**

Figures are rounded to achieve a total of 100%.

Biodiversity analyses within the Forest Plan assume the maximum level of harvest. The Forest Plan allows for an ASQ harvest of 267 MMBF. An ASQ of 267 MMBF equates to an annual harvest of about 8,529 acres of POG for the first decade of the plan. Less than half of the annual allowed harvest has occurred during the first 5.5 years of plan implementation. Therefore, the magnitude of timber harvest and the potential impacts on biodiversity have been less than those forecast in the Forest Plan. It appears that this trend will continue for the foreseeable future.

Table 2-6. Productive Old Growth Harvested in 1998 through 2002 by Ecological Subsection

		High volume			Medium volume			Low vol.	Other
TIMTYP VOL CLASS		6 & 7	5	5	5	4	4	4	
Ecological Subsection	Total acres Harvested	Acres	North Aspect	South Aspect	Hydric Acres	North Aspect	South Aspect	Hydric Acres	Acres
Behm Canal Complex	120	80	0	40	0	0	0	0	0
Bell Island Granitics	862	20	160	261	160	60	120	40	40
Traitors Cove Metasediments	1503	200	180	280	180	20	301	301	40
Central POW Till Lowlands	879	280	20	40	100	0	80	260	100
Central POW Volcanics	2904	381	220	601	320	200	521	381	280
Elevenmile Till Lowlands	161	0	20	0	20	20	60	20	20
Hetta Inlet Metasediments	981	200	120	220	0	100	220	40	80
North POW-Kuiu Carbonates	1121	660	60	321	0	0	60	0	20
Skowl Arm Till Lowlands	841	60	0	0	120	20	140	320	180
Duncan Canal Till Lowlands	897	20	120	259	60	80	179	160	20
Etolin Granitics	40	0	0	40	0	0	0	0	0
Kake Volcanics	120	0	0	20	0	0	40	20	40
Kuiu-POW Granitics	199	0	40	159	0	0	0	0	0
Rowan Sediments	480	140	80	200	20	0	0	40	0
Stikine Strait Complex	180	20	20	100	0	0	20	0	20
Sumner Strait Volcanics	920	40	199	300	0	60	180	40	100
Wrangell Narrows Metased.	1643	201	321	440	0	281	280	60	60
Zimovia Strait Complex	1980	0	220	400	60	240	700	200	160
North Baranof Complex	501	0	40	40	40	120	140	100	20
Peril Strait Granitics	140	0	60	20	20	40	0	0	0
Tongass Total*	**16472**	**2302**	**1880**	**3741**	**1100**	**1241**	**3041**	**1982**	**1180**

-For additional information see the SEIS, Table 3-2.17 (2003).
-The forest database was queried for all timber harvest from 1998 through 2002. The ROD was signed in mid-1997 so some timber harvested in the fall of 1997 is not reflected here.
-Caouette J.P. and E. DeGayner 2003. *A Forest Mapping and Classification Tool Developed by Modeling Tree Sizes and Densities in the Commercial Forests of Southeast Alaska*; in Press.
-Some columns or rows don't add up to total 100%; this is due to rounding errors.

Recommendations

1. Continue to monitor the amount and intensity of timber harvest as a "coarse filter" index for the effects of management on biodiversity.
2. Support efforts to construct better existing vegetation maps for the Tongass National Forest, particularly in mapping disturbance regimes and coarse canopy forest.
3. Continue to work on vegetation classification and mapping. Continue to evaluate the fieldwork completed on the accuracy assessment project and refine classification schemes accordingly.
4. Emphasize tracking and attributing OGRs in GIS with details on size, composition and disturbance regimes.

Biodiversity Question 3: Are management practices consistent with current knowledge regarding sensitive species conservation?

In the Forest Plan's monitoring plan (page 6-5), "sensitive species" are defined as federally (U. S. Fish and Wildlife Service [USFWS] and National Marine Fisheries Service [NMFS]) listed threatened or endangered species, Alaska Region (Forest Service) sensitive species, and state (Alaska Department of Fish and Game [ADF&G]) species of concern. The Forest Plan separates this monitoring question into four types of information.

Monitoring Results

The sampling methods are separated into four parts.

I. "Annually review (USFS) files and recent information regarding sensitive species taxa on the Tongass National Forest" (Forest Plan page 6-5).

Besides the BEs and BAs listed below, no Forest Service publications concerning sensitive species taxa occurring on the Tongass National Forest were written this year.

II. "Consult with other agencies regarding (management practices for) these species and whether additional species should be considered for addition to the Region 10 sensitive species list" (Forest Plan page6-5). Summarize the "…results of any consultations with ADF&G, USFWS or NMFS under the MOU with those agencies" (Forest Plan page 6-5).

Biologists checked their files in all Tongass National Forest offices and found only one letter from other agencies. The Thorne Bay Ranger District had one Section 7 consultation with US Fish and Wildlife Service for a timber sale. USFWS agreed to a "no effect" determination.

III. "Evaluate data collected in studies to determine the need for changes in the standards and guidelines of the Tongass Land Management Plan" (Forest Plan page 6-5).

No project-level effectiveness monitoring was performed during the 2002 fiscal year. Broad-scale monitoring continued for the Queen Charlotte goshawk.

IV. "Summarize results of Biological Evaluations (BEs) and associated effectiveness monitoring conducted at the project level" (Forest Plan page 6-5).

Biological Evaluations/Biological Assessments on Listed TES Species

Craig Ranger District completed two BE/BAs this fiscal year. Both had "not likely to adversely affect" determination on the listed species. Ketchikan Ranger District reported two BE/BAs. The results found "no effect" for T&E species and "may affect, but not likely to adversely affect" goshawk and trumpeter swans which are sensitive species. The Sitka Ranger District completed two BE/BAs. A "no effect" determination was reported for T&E species and "no impact" determination for sensitive species in both cases. The Thorne Bay Ranger District completed two BEs/BAs. Both had "no effect" for T&E species and "not likely to adversely affect" determinations for sensitive species. The Wrangell Ranger District completed four BE/BAs with a "no effect" determination for T&E species and a "not likely to adversely affect" determination for the sensitive species.

Sensitive Animal Biological Evaluations

Craig Ranger District completed two BEs with both having a "no effect" determination for terrestrial animal species. The Hoonah Ranger District completed two BEs. Both determined that "may affect individuals, but not likely to adversely affect for goshawks. Petersburg Ranger District completed three BEs with "no effect" determination. The Sitka Ranger District completed seven projects BEs this fiscal year. All had a "no effect" determination. Wrangell Ranger District completed one BE with a "no effect" determination. The Yakutat Ranger District wrote one BE with "may impact individuals but not likely to cause a trend toward Federal listing or loss of population viability" for osprey and goshawk and "no effect" for the remaining species.

Sensitive Plant BEs

Forest Service botanists, wildlife biologists, and biological technicians wrote BEs and Pre-field Reviews on plants for 11 projects during FY2002. In almost all cases, the determination was either "no effect" or "not likely to adversely affect" or wording with similar meaning as listed by ranger district below.

- Craig Ranger District: The BE for the Baker Island Trail included a sensitive plant survey and has a determination of "no adverse affects" for any sensitive plants. The BE for the Hollis/Hydaburg Power Line included a sensitive plant survey and has a determination of "no adverse affects" for any sensitive plants.
- Petersburg Ranger District: The BE for the Swan Lake Cabin Reconstruction included a rare plant survey of Level 6 intensity and has a determination of "not expected to adversely affect any sensitive plants." The Pre-Field Review for the Federal Aviation Administration Proposal for Level Island Site has a determination of "extremely low" probability of any sensitive plants occurring on the site. The Pre-Field Review for the FY2002/2003 Precommercial Thinning Project on Petersburg Ranger District has a determination of "not likely habitat for any of the suspected or known sensitive plants to occur on the Petersburg Ranger District."
- Sitka Ranger District: The BE for the Camp Coogan Bay Shoreties has a determination of "no impact" to any sensitive plant species. The BE for the Eradication of Japanese Knotweed at Deep Cove did not address sensitive plants. The BE for the False Island Blowdown Salvage and Red Alder Timber Sale has a determination of "no impact" on any sensitive plant species. The BE for the Hear Lake Transmission Line Access Road includes a botanical field survey and has a determination of "no impact" on any sensitive plants. The BE for Precommercial Thinning on the Hoonah, Juneau, and Sitka Ranger Districts for FY2002 has a determination of "no impact" on any sensitive plants.
- Yakutat Ranger District: The BE for the Mountain Lake Trail Reconstruction included a botanical survey of Level 5 intensity and has a determination of "not expected to adversely affect any sensitive plants."

Evaluation of Monitoring Results

The Ranger District biologists completed 12 Biological Assessment/Biological Evaluations during the 2002 fiscal year. All determinations for Federally listed species were "no effect". Sixteen Biological evaluations were completed for Regional Forester's sensitive species most had a determination of "no impact" or "no effect". Several had a determination of "may affect but not likely to adversely affect".

No formal evidence was found within fiscal year 2002 written analyses or correspondences indicating that the Regional Forester's sensitive species lists are in need of revision at this time. The Tongass Forest Plan standards and guidelines for sensitive species generally appear adequate. However, a mechanism needs to be found to apply the marine mammal disturbance standards and guidelines to non-Forest Service personnel and vehicles when they are associated with USDA Forest Service projects (or permitted activities) but are not under the direct supervision of Forest Service personnel (e.g. log rafts under tow). The design of the partial harvest standards and guidelines for goshawks and marten should perhaps be reconsidered. However, any analysis should fully consider that the existing standards and guidelines, which call for a fairly even distribution of leave trees, might be the best system for the majority of rainforest forest biota as well as best for the long-term ecological function of the stand many decades into the future.

Tongass biologists and botanists need to assure that the wording of each BE/BA determination is consistent with Forest Service manual direction. Also, Tongass biologists and botanists need to carefully describe the logic for their conclusions in their BEs and BAs. BE/BA determinations need to be based on the type and magnitude of the proposed project, site-specific species surveys or local information such as existing databases, scientific literature and/or previous analyses. A BE/BA template is being reviewed. Given such information, logical deductions may then be made in such a manner that other biologists or botanists would likely arrive at the same conclusion.

Biodiversity Question 4: Are destructive insect and disease organisms increasing to potentially damaging levels following management activities?

Goal: Part 219 of the National Forest System Land and Resource Management Planning regulations (36 CFR section 219.12) requires the monitoring of forest health and determining if destructive insect and disease organisms have increased following vegetation management. Areas are identified where there is an increase to damaging levels. Monitor forest health and determine if there is an increase following vegetation management as required by (36 CFR section 219.12).

Objective: Identify areas where destructive insect and disease organisms increase following management. Evaluate the results and modify vegetation management practices if they increase to damaging levels.

Background: A key premise of ecosystem management is that native species have adapted to, and in part, evolved with natural disturbance events. Along with wind, avalanche, and other disturbance agents, insects and diseases are important factors in the Tongass National Forest. Most occurrences of insects and disease are natural and considered a part of, and contributing factor to, ecosystem diversity. Endemic levels of insect and disease activity are usually allowed to run their course. Heart rot decays are a key agent causing small-scale disturbance in the Forest, which results in bole breakage in older trees. Average defect in late seral stands is approximately 1/3 of gross volume. The incidence of decay is significantly related to tree age. Research by Kimmey (1956) also indicates that volume losses are small in young trees. Hemlock and spruce less than about 100 years of age are generally sound. Older hemlock deteriorates at a faster rate than Sitka spruce. Based on research by James Kimmey, for trees in age class 151 to 200, defect in Sitka spruce was 5 percent, while in hemlock it was 16 percent (Farr, 1976). At 300 to 400 years of age, spruce was relatively rot free, whereas decay in hemlock averaged 30 to 40 percent on a board-foot basis (Farr, 1976).

As for forest insects, trends in population are generally linked to weather conditions as opposed to forest management practices. For example, the spruce needle aphid occurred on 44,400 acres in Southeast Alaska from the southern end of Prince of Wales Island to Cape Fairweather in 1998, 29,500 acres in 2000, and 20,200 acres in 2001, but only 1,640 acres in 2002. The winters of 1998, 2000, and 2001 were generally mild for Southeast Alaska. The cold temperatures throughout April, 2002 killed many emerging spruce aphids. Areas affected by the outbreak were late-seral spruce-hemlock forest and not managed young-growth.

Other defoliating insects, hemlock sawfly and black-headed budworm, have caused growth loss, top kill, and some mortality in late-seral forests. Outbreaks can affect western hemlock and to a lesser extent Sitka spruce throughout the Tongass, as did the outbreak in the early 1950's, which resulted in top kill and mortality on only a fraction of the acres affected. In 2000, 2001, and 2002 only 5,200, 1,300, and 382 acres, respectively, of hemlock sawfly defoliation were recorded. In 2002, 350 acres of black-headed budworm defoliated trees were recorded. Spruce beetle has been a rather minor problem on the Tongass compared to other lands in Alaska but outbreaks such as the one brought on by the extensive windthrow that occurred in the winter of 1990-1991 resulted in the buildup of a population of beetles that killed many acres of high value Sitka spruce throughout Southeast Alaska. These spruce beetle outbreaks are short. The annual pest survey will help to identify where mortality has most recently occurred so that trees can be harvested before they decay. Only 109 acres were mapped on the Tongass National Forest in 2000. Only two acres of spruce beetle and 80 and 27 acres of hemlock canker mortality occurred on the Tongass in 2001 and 2002, respectively.

Monitoring Question: Are destructive insect and disease organisms increasing to potentially damaging levels following management activities?

The State and Private Forestry, Forest Health Group, branch of the Forest Service flies annual aerial detection surveys over Southeast Alaska. The location of insect and disease activity is mapped and entered in a geographic information system (GIS) database. In addition to the aerial survey work, on-the-ground site visits are also conducted. In general, current management reduces the incidence and severity of insect and disease occurrence by removing infected trees through timber harvest. Even-aged vegetation management (clearcutting, seed tree or shelterwood regeneration methods) removes defective trees with fungal infections or those with mistletoe. The Forest Plan estimated that approximately 80

percent of future harvests would use the even-aged system. Past management has been above this level. The young growth that results after an even-aged harvest is vigorous and usually decay-free.

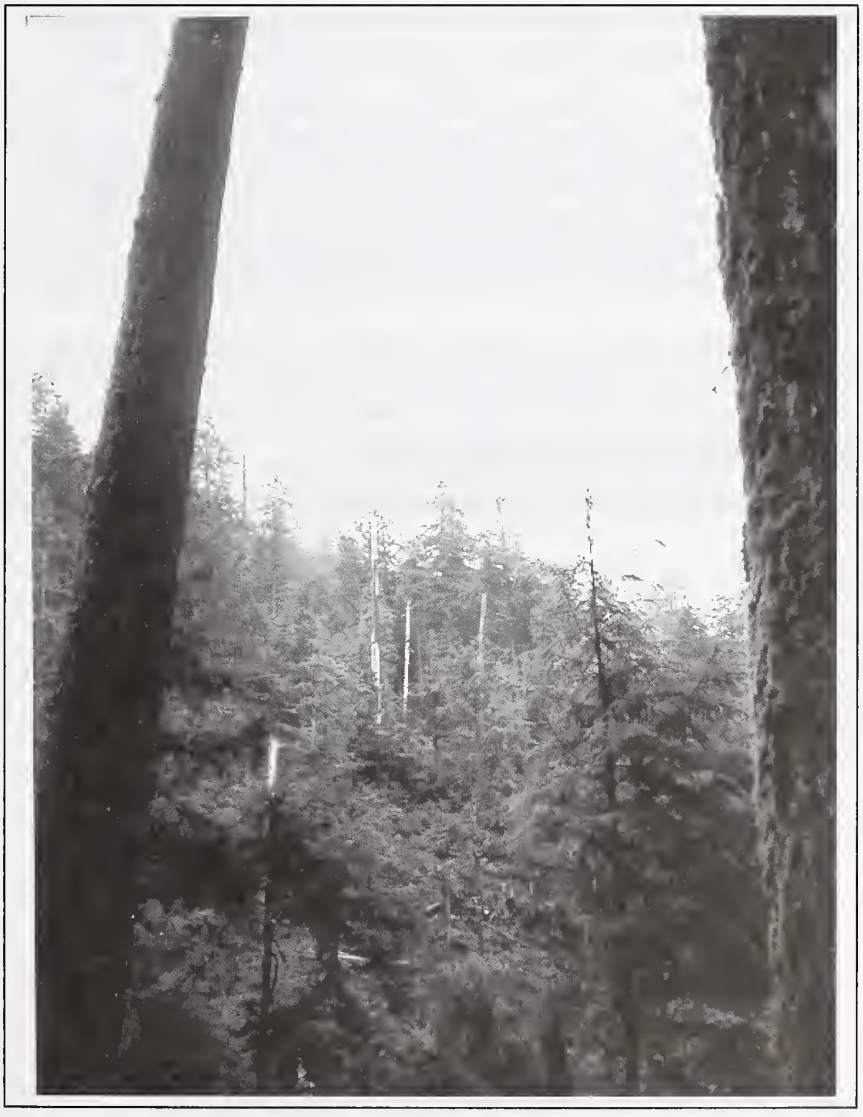
Currently the Forest Service is exploring alternatives to clearcutting where portions of the stand, either as single trees or groups of trees, are left as legacy (residual) trees. Questions have been raised as to whether increased blowdown and increased insect and disease damage will occur due to bole wounding of residual trees and/or retention of mistletoe and other infestations within the stand. These questions will be studied in a series of three research installations across the Tongass National Forest. Results of these studies will not be available for three to five years.

Monitoring Results

The most important diseases and natural declines on the Tongass National Forest since approval of the Forest Plan in 1997, including 2002, were wood decay of live trees, hemlock dwarf mistletoe, and yellow-cedar decline. Heart and butt rot fungi cause substantial decay in late seral spruce-hemlock forests. No serious insect or disease organisms in young-growth stands were detected through monitoring efforts.

Evaluation of Results

The monitoring work conducted annually by the State and Private Forestry branch of the Forest Service, Forest Health Group and the Forest Silvicultural staff is adequate.



Fish Habitat

Goal: Maintain or restore the natural range and frequency of aquatic habitat conditions on the Tongass National Forest to maintain the abundance and diversity of resident and anadromous fish.

Objective: Determine if our best management practices (BMPs) and Forest Plan standards and guidelines have been implemented and if they are effective in protecting fish habitat and fish populations. Monitor key stream channel characteristics and representative fish populations to determine if trends attributable to forest management are evident.

Background: Fish and aquatic resources on the Tongass National Forest provide major subsistence, commercial, and sport fisheries. Abundant rainfall and watersheds with high stream densities provide a high number and diversity of freshwater fish habitats. The Tongass National Forest provides spawning and rearing habitats for the majority of fish produced in Southeast Alaska. Maintenance of this habitat and high water quality is of concern to the public, State and Federal natural resource agencies, and Native organizations.

In FY 2002, major emphasis was placed on monitoring resident fish populations, fish passage conditions at road culverts, BMP implementation, and stream habitats. Work continued to develop a synthesized approach for all aspects of fish habitat monitoring. A technical team of Forest Service specialists and an advisory team of employees from cooperating agencies continued to meet, and a plan for synthesizing the aquatic monitoring was developed.

Fish Habitat Question 1: Are population trends for Management Indicator Species (MIS) and their relationship to habitat changes consistent with expectations?

A monitoring program for trends in the populations of resident cutthroat trout and Dolly Varden char and their habitat was in the fourth year. This year abundance estimates were completed in 19 of the 22 monitoring streams and Tier 3 habitat surveys were completed in 20 of the 22 streams.

The protocol incorporates a design that requires annual monitoring of streams before and after timber harvest. Sixteen streams were sampled for the third or fourth year in this long-term program. Timber harvest has begun in the watersheds of two of the streams and harvest may begin within the next 2 years for 9 additional streams.

ADF&G commercial harvest and adult escapement data are reported for pink and coho salmon for the period 1997 through 2002.

Monitoring Results for Resident Cutthroat and Dolly Varden

Twenty treatment and two control streams have been identified that meet the selection criteria (Table 2-7).

These criteria include:

- Resident cutthroat and/or Dolly Varden;
- Upstream from migration barriers to prevent interaction with anadromous fish;
- FP3, MM1, or closely related channel types;
- No previous logging, but with planned future logging; and
- Not connected to lakes.

The control streams meet the criteria except there is no planned future logging.

Table 2-7. Summary of Stream Reaches for Resident Fish Monitoring in 2002

Ranger District	Stream Name	Year of Timber Harvest	Field Verified	Channel Type	Fish Species	Population Estimate	Habitat Survey
Craig	Drinking Water Cr	2005	Yes	MM1	Cut, DV	Yes	Yes
	N Perkins Cr	Roadless	Yes	MM1	Cut, DV	Yes	Yes
	Keg Cr	Control	Yes	FP4	DV	No	Yes
Hoonah	S Fork Freshwater Cr	2005	Yes	MM1	Cut, DV	Yes	Yes
Juneau	Dry Bay Upper	Roadless	Yes	FP3	DV	No	No
	Dry Bay Lower	Roadless	Yes	FP3	DV	No	No
Ketchikan-Misty	Montana Cr	2005	Yes	MM1	Cut	Yes	Yes
	Packer Cr	2006	Yes	MM1	Cut, DV	Yes	Yes
	Gun Sight Cr	2006	Yes	MM1	DV	Yes	Yes
	Salty Cr	2001	Yes	MM1	Cut	Yes	Yes
	Emerald Cr	2005	Yes	FP3	Cut	Yes	Yes
Petersburg	N Arm Farragut Cr	Roadless	Yes	FP3	Cut, DV	Yes	Yes
	Upper Tunehean Cr	2002	Yes	MM1	Cut, DV	Yes	Yes
	Lower Zim Cr	Roadless	Yes	MM1	Cut, DV	Yes	Yes
	Upper Zim Cr	Roadless	Yes	FP3	Cut, DV	Yes	Yes
	Upper Ohmer	Control	Yes	FP3	DV	Yes	Yes
Sitka	Corner Bay Tributary	2006	Yes	MM1	Cut	Yes	Yes
Thorne Bay	No streams identified						
Wrangell	Gypsy Mainstem	2005	Yes	MM1	Cut	Yes	Yes
	Gypsy Tributary	2005	Yes	MC1	Cut	Yes	Yes
	West Fork Hoya Cr	2004	Yes	FP3	DV	Yes	Yes
	Vial Cr	2004	Yes	MM1	DV	Yes	Yes
	Jenkins Cr	2005	Yes	MM1	Cut	Yes	Yes
Yakutat	No streams identified						

Timber harvest has begun in two of the watersheds (Salty and Upper Tunehean) and is planned to begin in another in 2004 (Table 2-7). Six of the treatment streams are associated with timber sales that will be delayed due to the recent roadless designation.

The abundance of cutthroat and Dolly Varden varies widely among the sampled streams (Table 2-8). We anticipated finding more fish in FP3 channels compared to the slightly steeper MM1 channels. While it is generally true that FP3 channels have high numbers of fish, the stream with the most fish is an MM1 channel. This stream, Gunsight Creek, has only Dolly Varden and the estimated number in the monitoring reach for 2002 was 358. Different stream lengths do not explain the differences in number of fish, as the lengths of all monitoring sections are roughly identical ranging from approximately 350 to 400 feet.

Table 2-8. Fish Abundance Estimates for 1999 through 2002

Ranger District	Stream Name	Year of Timber Harvest	Fish Species	1999	2000	2001	2002
Craig	Drinking Water Cr	2006	Cut	3	12	9	27
	Drinking Water Cr	2006	DV	19	14	33	15
	N Perkins Cr	Roadless	Cut	18	17	18	25
	N Perkins Cr	Roadless	DV	11	20	4	11
	Keg Cr	Control	DV		99	131	
Hoonah	S Fork Freshwater	2005	Cut	No estimate		12	29
	S Fork Freshwater	2005	DV	19		No estimate	4
Juneau	Dry Bay Upper	Roadless	DV			166	
	Dry Bay Lower	Roadless	DV			79	
Ketchikan-Misty	Montana Cr	2005	Cut	31	39	42	73
	Packer Cr	2006	Cut		59	44	80
	Packer Cr	2006	DV		44	38	42
	Gunsight Cr	2006	DV		212	331	358
	Salty Cr	2001	Cut		50	81	99
	Emerald Cr	2005	Cut			63	50
	Emerald Cr	2005	DV			52	60
Petersburg	N Arm Farragut Cr	Roadless	Cut	91	133	91	74
	N Arm Farragut Cr	Roadless	DV	19	50	38	56
	Upper Tunehean Cr	2002	Cut	97	119	54	49
	Upper Tunehean Cr	2002	DV	54	79	46	56
	Lower Zim Cr	Roadless	Cut		74	53	61
	Lower Zim Cr	Roadless	DV		No estimate	18	42
	Upper Zim Cr	Roadless	Cut		107	45	67
	Upper Zim Cr	Roadless	DV		56	16	37
	Ohmer Cr	Control	DV			51	132
Sitka	Corner Bay Cr	2006	Cut			72	38
	Corner Bay Cr	2006	DV			43	42
Wrangell	Gypsy Mainstem	2005	Cut	33	32	73	42
	Gypsy Tributary	2005	Cut	33	61	32	56
	West Fork Hoya Cr	2004	DV		169	139	173
	Vial Cr	2004	DV		142	88	164
	Jenkins	2005	Cut			54	60
	Jenkins	2005	DV			63	68

The amounts of habitat features important to fish are shown for the monitoring streams in Table 2-9. Annual variation within streams is evident and differences are evident between streams. The most important habitat comparisons will be the before and after timber harvest for the same streams. Complete data on reach lengths and additional descriptions of the large woody debris, the pools, and substrates are in the project files.

Table 2-9. Stream Habitat Survey Results for 1999 through 2002

Ranger District	Stream Name	Year of Survey	Total Pieces LWD	Total Pool Area (M^2)	Average Residual Pool Depth (M)	Length Undercut Banks (M)	Substrate (D50) (MM)
Craig	Drinking Water Cr	1999	38	113.3	0.31	124	68
		2000	41	162	0.31	99	70
		2001	29	136.4		82	90
		2002	46	157.8	0.36	104	
	N Perkins Cr	1999	33	96.8	0.29	87	20
		2001	45	154.2	0.30	132	32
		2002	52		0.30	126.5	I
	Keg Cr	2000	44	207.7	0.62	39	48
		2001	62	207.1	0.53	118	45
		2002	66	286.2	0.65	42.0	
Hoonah	S Fork Freshwater	1999	41		0.30		30
		2001	91	57.7	0.43	24	48
		2002	85	67.2	0.32	21.5	
Juneau	Dry Bay Lower	2001	39	224.9	0.46	64.5	48
		2002					
	Dry Bay Upper	2001	52	224.7	0.48	35.3	48
		2002					
Ketchikan/ Misty	Montana Cr	1999	22	154.7	0.31	19	42
		2000	32	160.6	0.31	0	39
		2001	25	91.8	0.34	0	55
		2002	10	102.9	0.71	0	
	Packer Cr	2000	37	184.6	0.34	11	55
		2001	23	112.0	0.37	0	58
		2002	25	117.9	0.33	1.10	
	Gun Sight Cr	2000	99	295.5	0.61	33	31
		2001	96	413.2	0.55	30	53
		2002	87	478.7	0.49		
	Salty Cr	2000	20	59.7	0.30	11	45
		2001	38	159.1	0.35	1	57
		2002	30	103.2	0.39	1.0	
	Emerald Cr	2001					
		2002	21	220.2	0.42	4.68	
Petersburg	N Arm Farragut Cr	1999	62	460.6	0.49	20	30
		2002	63	314.6	0.51	81.0	
	Upper Tunehean Cr	2001	79	104.1	0.40	34	64
		2002	75	135.1	0.36	39.8	
	Lower Zim Cr	2001	58	150.1	0.36	4	64
		2002	72	202.1	0.38	17.3	
	Upper Zim Cr	2001	73	261.1	0.47	50.1	32
		2002	62	233.1	0.44	63.3	
	Upper Ohmer Cr	2001	77	458.6	0.54	69.8	64
		2002	73	511.8	0.45	101.2	
Sitka	Corner Bay Cr	2001	44	133.2	0.35	38.4	96
		2002	55	139.2	0.36	48.3	
Wrangell	Gypsy Mainstem	1999	83	455.1	0.60	47	102
		2001	79	383.3	0.59	46	32
		2002	62	343.6	0.50	34.5	
	Gypsy Tributary	1999	22	135.1	0.30	8	73
		2001	30	95.6	0.30	23.5	64
		2002	39	133.9	0.30	41.7	
	West Fork Hoya Cr	2001	64	554.7	0.61	68.0	64
		2002	73	554.5	0.62	76.6	
	Vial Cr	2001	23	269.4	0.62	6	64
		2002	44	383.1	0.58	8.5	
	Jenkins Cr	2001	72	339.7	0.57	73	32
		2002	78	359.8	0.51	98.5	

Evaluation of Results

Year 2002 was the fourth year for the resident fish MIS monitoring program. A major goal for the year was to complete population estimates and habitat surveys in all 22 monitoring streams. This goal was nearly achieved, but several streams were not monitored primarily due to poor weather that prevented flying to the streams.

Power analysis has suggested 16 treatment streams will be necessary for an 80 percent chance of detecting a decline in fish populations of 0.80 of the standard deviation of the samples. Existing long-term data sets for resident cutthroat in Oregon and for Dolly Varden in SE Alaska indicate we will be able to detect a decline of approximately 20 percent of the pre-logging mean annual population.

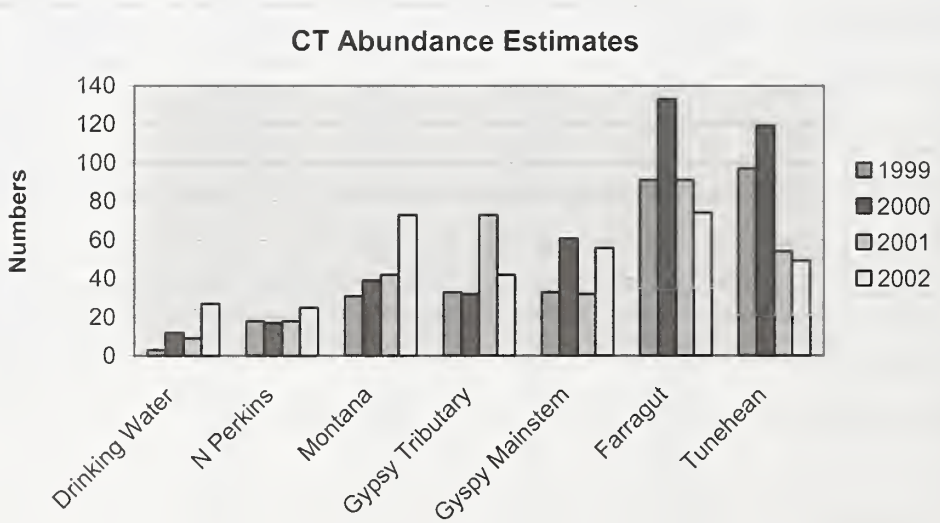
Even though the power analysis indicated 16 streams would be sufficient for the minimum monitoring program, we now have 20 treatment streams and plan to continue identifying and adding treatment streams for a more robust program. Doing so will compensate for potential fall-down in the planned timber harvest that will likely reduce our sample of treatment streams.

Control streams were added to the design following a recommendation from the IMEG. Control streams are not required for the planned paired-t test, but will help to explain changes in the fish abundance that might not be related to timber harvest. We plan to focus our resources on adding more treatment streams, but will also include more controls where possible.

We now have enough monitoring data to begin looking for trends in both fish abundance and stream habitat. The cutthroat abundance and pool area data are included as examples (Figure 2-1 and 2-2). No consistent trends are evident in the cutthroat abundance estimates for the streams with 4 years of data. Some streams appear to have an increasing trend, for example Montana Creek, and other streams, like Tunehean Creek, have a decreasing trend. Other streams demonstrate no apparent trend.

The data in Figure 2-1 show the difference in abundance of cutthroat between the streams. The range is from less than 20 to over 100 fish. Also, the annual variation in the abundance estimates is relatively large for some streams, and small for others, like North Perkins Creek.

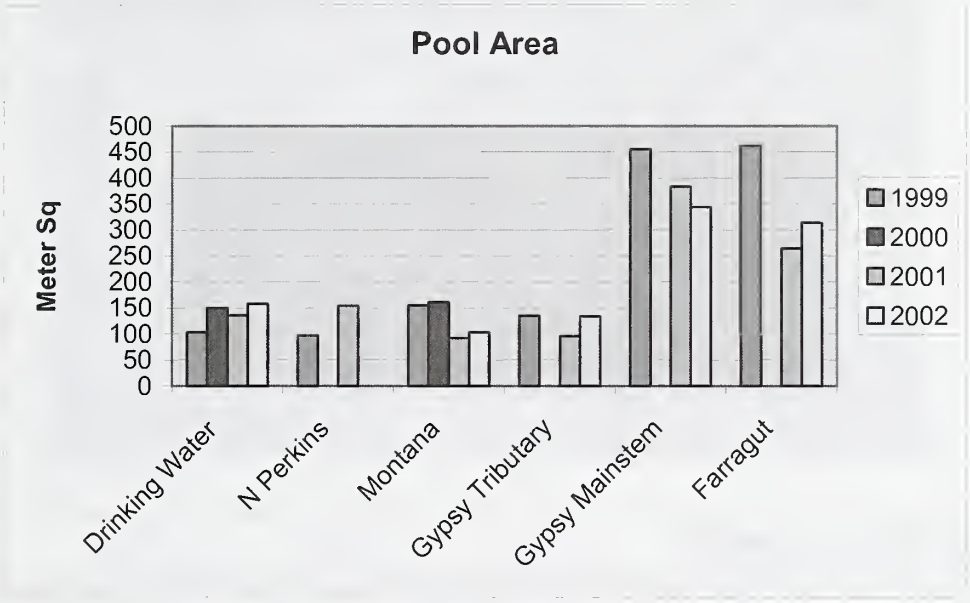
Figure 2-1. Cutthroat abundance estimates for streams with 4 years of data.



Even though timber harvest has begun for two of the streams, it is unlikely to have influenced the trends. A large culvert was being installed in Tunehean Creek just upstream from the monitoring site as the abundance estimate was being completed. It is possible this activity depressed the 2002 abundance estimate, but would have had no influence on the also depressed 2001 estimate. We are likely observing natural variation.

Similar to the abundance data, no apparent trends are evident in the area of pools for streams with 3 or 4 years of data (Figure 2-2). Again there are major differences in pool area between streams and some streams have substantial annual variation.

Figure 2-2. Measured pool area for the streams with 3 or 4 years of data.



A crew of two or three people completed the monitoring for each stream. A Supervisor's Office employee traveled to the districts and worked with a district representative. This approach provided training for the often-newer district employees. Ketchikan Ranger District employees monitored streams on their district with a crew of experienced employees. Both approaches helped insure consistency and will be used again next year.

Monitoring Results for Pink Salmon

Annual commercial harvest of pink salmon is reported by the Alaska Department of Fish and Game and the Forest Service evaluated these estimates to see if any long-term trends are evident. The annual commercial harvest is an indicator of population abundance. Harvest data from 1997 (the year the Record of Decision was signed) through 2002 are presented in Table 2-10.

Table 2-10. Annual commercial harvest of pink salmon in SE Alaska from 1997 through 2002

1997	1998	1999	2000	2001	2002
28,980,886	42,535,391	77,848,256	20,313,433	67,049,243	45,327,801

Data compiled by ADF&G.

Another indicator of pink salmon abundance is the number of adult fish that return to the stream and spawn each year. ADF&G biologists fly over the streams and count pink salmon concentrated on broad spawning riffles. ADF&G annually reports this spawning-survey data (commonly and hereafter called "escapement" data) for a series of index streams across SE Alaska and the Forest Service additionally evaluated the escapement data for long-term trends (Table 2-11).

Table 2-11. Annual escapement of pink salmon in SE Alaska from 1997 through 2002

1997	1998	1999	2000	2001	2002
14,521,757	15,934,835	30,393,400	12,074,389	19,203,094	14,865,310

Data compiled by ADF&G.

No long-term trends are evident in the 6 years of harvest and escapement data from 1997 through 2002. After reviewing the entire data set for commercial harvest of pink salmon (that begins in 1892), it is interesting to note that the harvests in 1999 and 2001 were the highest and second highest recorded.

Evaluation of Results

The combination of annual harvest and escapement is a good indicator of the annual abundance and potential trends for the pink salmon returning to SE Alaska. It is generally believed, that pink salmon abundance is controlled by several factors including freezing of streams in the winter when eggs are incubating in stream gravels and the cyclical productivity of the marine environment when juvenile pink

salmon are rearing in the estuaries and the North Pacific Ocean. Quality of the freshwater habitat, mainly the percentage of fine sediment in the spawning gravel, is also important and may be affected by forest management, but is likely overshadowed by the influence of winter freezing and ocean productivity.

We are currently designing a study to see how sensitive pink salmon escapement has been to previous forest management. We plan to review the approximately 30 years of spawning escapement data that have been collected in over 700 watersheds and the timber harvest history for the same watersheds.

Kuiu Island was selected as a pilot for this study. Eighty-one streams were identified for Kuiu that have long-term escapement records, and a strategy has been developed to quantify the logging history for each watershed. We generated information on the percent of the watersheds harvested by year, the percent harvested on slopes greater than 72 percent, the percent harvested in riparian areas, the road density, the amount of road on slopes greater than 35 percent, and the amount of road within riparian areas and on wetlands. Searching for relationships between escapement and timber harvest slowed in 2002 as the pink salmon escapement data is not currently in a form suitable for use in this project. The data is being upgraded by ADF&G to a suitable form.

Monitoring Results for Coho Salmon

Similar to pink salmon, annual commercial harvest of coho salmon is reported by the ADF&G and the Forest Service evaluated these estimates to see if long-term trends are evident (Table 2-12).

Table 2-12. Annual commercial harvest of coho salmon in SE Alaska from 1997 through 2002

1997	1998	1999	2000	2001	2002
1,974,488	2,989,080	3,630,234	1,956,948	3,256,630	3,124,600

Data compiled by ADF&G.

Estimates of coho escapement is more difficult to collect than escapement of pink salmon as coho enter the streams during the fall when flows are often high and coho routinely distribute throughout the watersheds including into small tributary streams. Consequently, coho cannot be counted from an airplane and the ADF&G has selected a small number of representative streams across SE Alaska to carefully (and expensively) count or estimate escapement. Data from these streams and rivers are the best available for the Forest Service to review for long-term trends (Table 2-13)

Table 2-13. Annual escapement of coho salmon in six index streams from 1997 through 2002

	1997	1998	1999	2000	2001	2002
Auke Cr	609	862	845	683	865	1,112
Berners R	10,050	6,802	9,920	10,650	19,290	27,700
Ford Arm L	4,965	7,049	3,598	2,287	2,178	7,109
High Smith L	732	983	1,246	600	1,580	3,291
Taku R	32,345	61,382	60,768	77,078	110,035	177,589
Black R	686	1,520	1,590	880	1,080	1,194

Data compiled by ADF&G.

No long-term trends are evident in the six years of data from 1997 through 2002. A pattern of high escapement in 2002 is evident for all the index streams. The ADF&G attributes this to reduced commercial fishing effort and harvest due to low selling prices for wild salmon.

After reviewing the entire data set for commercial harvest that extends back to the late 1800's, it was interesting to note that the commercial harvests of coho salmon were high in 1999 and 2001. They were

the eighth and fourteenth highest. These are the same years that high harvest was recorded for pink salmon.

Evaluation of Results

The region-wide harvest data and escapement data from index streams are good indicators of the annual abundance and potential trends of coho returning to SE Alaska. Since juvenile coho normally spend 1 or 2 years rearing in freshwater, coho abundance is likely more affected by changes in the quality of stream habitat than pink salmon, which migrate to salt water shortly after emergence. Research studies in the Pacific Northwest and in SE Alaska have shown that forest management affects coho salmon on a stream-by-stream basis. Again similar to pink salmon, coho are also affected by the severity of winter weather and the cyclical productivity of the marine environment.

Development of Monitoring Protocols using Juvenile Coho Salmon

The Forest Sciences Laboratory is developing and testing a protocol to use juvenile coho salmon abundance in tributary streams as an indicator of potential effects of forest management.

Coho salmon have several characteristics that make them an appropriate indicator of forest management practices in southeast Alaska. They are widely distributed throughout the Tongass National Forest and occupy habitats that are closely linked to forest management activities such as timber harvest and road construction. The freshwater residence of juvenile coho salmon in southeast Alaska is usually one or two years (i.e. two summers) following emergence from the gravel. Juvenile coho salmon are sensitive to a range of perturbations both natural and human caused (Meehan 1991). This is evident from the decline of anadromous salmonids throughout the Pacific Northwest that has been attributed to a combination of causes that include widespread habitat degradation, dams, and over-fishing (Gregory and Bisson 1997; Nehlson 1997). Studies throughout the Pacific Northwest and southeast Alaska demonstrate that juvenile coho salmon are sensitive to a range of physical habitat attributes (Reeves et al. 1989; Shirvell 1990; Bugert et al. 1991; Fausch 1993; Nass et al. 1996; Keith et al. 1998). As a result, coho salmon populations may be more sensitive to land management activities than other species that spend less time in freshwater, such as chum salmon (O. keta).

The goal of the monitoring protocol is to measure changes in coho salmon abundance in freshwater habitat that may be related to management practices as prescribed in the Forest Plan. The purpose of this study is to develop and test a monitoring protocol using juvenile coho salmon as a management indicator species in watersheds subject to timber harvest using the guidelines and directives in the Forest Plan.

A study plan was completed in June 2002 and revised in July 2002 to expand the objectives to review monitoring protocols and use of management indicator species, and to review and develop statistical methodologies for the study. A GIS query using selective criteria identified in the study plan identified four sites where timber harvests occurred using the Forest Plan management prescriptions. One is located on Mitkof Island, two are located on Kupreanof, and one on Kuiu Island. A GIS query for sites where timber harvest occurred after 1997 Forest Plan prescriptions were implemented produced 127 sites; however, many of these units were planned before Forest Plan prescriptions were applied and the management guidelines used were uncertain. Fourteen streams in 5 watersheds were visited and sampled for fish populations. Four watersheds, Rio Beaver, Rio Roberts, Paul Young, and Staney, were located on Prince of Wales Island. Falls Creek was located on Mitkof Island and juvenile coho salmon were not found in 3 of the streams that were sampled. The relative abundance of juvenile coho salmon was high in 7 of the streams on Prince of Wale Island. None of the streams had reaches that fell into the post-Forest Plan treatment category. A detailed description of the study and the results are available in the study plan 2003 and the progress report for 2002.

Evaluation of Results

Abundant sites are available for control and pre-Forest Plan treatments and will contribute to the evaluation of the sensitivity of the protocol. The sample universe for post-Forest Plan treatment sites is considerably smaller; however, not surprising given the modest timber harvest since the Forest Plan was implemented and the relatively short time period since its prescriptions were applied to forest management. Sample sites that are located in watersheds where timber sales are planned will increase

the strength of the sample base. The sample design of this study will provide a set of index streams that can be sampled over a period of ten or more years.

Fish Habitat Question 2: Are Fish Riparian standards and guidelines being implemented?

Best management practices (BMPs) described in the Soil and Water Conservation Handbook (Forest Service Handbook 2509.22, October 1996) define practices that provide protection for soil and water resources. The Fish Riparian standards and guidelines define site-specific measures to protect the resources. These standards and guidelines were monitored following a methodology described in the Tongass Monitoring Strategy. The strategy was developed to provide direction for Tongass Land Management Plan implementation monitoring. Please refer to the *Tongass Best Management Practice Implementation Monitoring Report: Fiscal Year 2002* (available upon request) for details on how the monitoring was conducted. A summary of the findings for the fish and riparian resources relative to disturbance is given below.

The BMP implementation monitoring included two distinct efforts: (1) 100 percent monitoring of the units closed out and roads complete, and (2) Interdisciplinary Team (IDT) quality control monitoring. The 100 percent monitoring was primarily conducted by Forest Service sale administrators and engineering representatives and in a few circumstances with assistance from resource specialists. A team of Forest Service employees and other Federal and State agency representatives conducted the IDT monitoring. Including sale administrators, engineers, foresters, planners, and resource specialists from soils, water and fisheries. The IDT monitoring was conducted on a stratified random sample of more than 10 percent of units and roads monitored during the 100 percent monitoring effort.

Monitoring Context

Planning for some of the roads and units was completed before the Soil and Water Conservation Handbook was revised in October 1996, and new Forest Plan Standards and Guidelines were approved in May 1997. Both documents included many improvements for protecting soil and water resources. Several important changes in the 1996 Soil and Water Conservation Handbook include improving wetlands management direction, considering stream buffer wind throw, and generally making Forest Service BMPs consistent with State Forest Practices Regulations. A few of the important changes included in the 1997 Forest Plan FEIS and the revised Forest Plan Standards and Guidelines resulted in new stream class definitions, and stream protection measures required for each stream class and channel type. Buffer protection of Class III streams was entirely new. A number of the units monitored were planned, laid out, and harvested under pre-1997 Forest Plan Standards and Guidelines.

Reviewing the timber sales and respective environmental documents most of the units were harvested under contacts that were included in EISs or EAs that were signed before the 1997 Forest Plan. The units and roads in the FY 2002 monitoring pool are listed below with their respective EIS/ EAs or contracts. The small sales and public works contracts were all implemented under the 1997 Standards and Guidelines.

Table 2-14. Units Monitored in FY 2002 through BMP Implementation Monitoring Process

Units	Timber Sale; EIS/ EA (decision year)
429-14	Shamrock TS; Shamrock EIS (1996)
140	South Central TS; South Lindenberg EIS (1996)
60	South Saddle TS; South Lindenberg EIS (1996)
436-23, 436-61; 438-22	Four Leaf TS; Shamrock EIS (1996)
1*,2*,5	Salty TS; Salty EA (2000)
148*	South Pass TS; South Lindenberg EIS (1996)
1a, 1b, 1c	Rolling Rock TS; Polk Small Sales
1	Fork TS; Polk Small Sales
1	Micro TS
1	Little Naukati Salvage TS; Priority Windthrow

* Units monitored by IDT

Table 2-15. Roads Monitored in FY 2002 through BMP Implementation Monitoring Process

Roads	Road Contract/ Timber Sale
6354 Reconstruction	South Saddle TS; South Lindenberg EIS (1996)
6350* Reconstruction	South Lindy TS; South Lindenberg EIS (1996)
43506	South Lindy TS; South Lindenberg EIS (1996)
2160980, 2160982, 2160985, 2160986	South Arm TS, Chasina TS (1998)
3030850, 2054300, 2054000, 3000000	POW Fish Pass Improvement; Public Works Contract
6314	Four Leaf TS; Shamrock EIS (1996)
6415 Relocation	Public Works Contract
45906	Four Leaf TS; Shamrock EIS (1996)
40000 Reconstruction	40000 Resurfacing Public Works Contract
6209 Reconstruction	6209 Resurfacing; Public Works Contract
40000* & 6235 Mitkof Fish Passage	Mitkof Fish Passage Culvert Replacement; Public Works

* Road 6350 milepost (MP) 4.6, 4.7; Road 40000 MP 2.42, 3.337 monitored by IDT

Monitoring Results

The text below discusses results from the total units and roads monitored in the 100 percent and IDT monitoring efforts. This monitoring covered 377.2 acres in 16 harvest units and 18 roads. Details of the monitoring of the Best Management Practices are summarized in Soil and Water 3 and included in entirety in the "Description of Best Management Practices Monitored" section in the *Tongass Best Management Practice Implementation Monitoring Report: Fiscal Year 2002* (available upon request).

BMPs Applicable to Fish and Riparian Management

BMP 12.6 Riparian Area Designation and Protection
BMP 12.6a Buffer Design and Layout (TTRA and other buffers)
BMP 13.16 Stream Channel Protection
BMP 14.6 Timing Restrictions for Construction Activities
BMP 14.14/ 14.17 Bridge and Culvert Design and Installation (fish passage)

As part of the best management practices implementation monitoring, information is collected on the streams monitored in the harvest units. The following tables show the number of linear feet of stream channel protected and the approximate number of stream buffer acres retained and monitored through the 100 percent process, and 65 acres monitored through the 10 percent IDT quality control monitoring in FY 2002. Some of the units monitored were planned, laid out, and logged under pre-1997 Forest Plan Standards and Guidelines. Refer to Soil and Water Question 3 for additional details. A significant length of stream channels was reported as protected during unit harvest in the implementation monitoring effort in FY 2002 as shown in the table below. These stream lengths and associated buffer areas show that the stream protection measures are being implemented.

Comparison of the stream data collected during the IDT monitoring effort and the total implementation monitoring effort illustrated on Table 2-16 shows that a significant number of the protected streams were checked during the IDT monitoring process. In the 10% quality control monitoring, roughly 16% of the stream lengths protected were reviewed by the IDT. Table 2-16 provides some detail on the lineal feet and acres of streams buffered. These buffers were implemented on Shamrock 429-14, South Saddle 60, Four Leaf 436-23, Four Leaf 438-22, Salty 1, South Pass 148, Rolling Rock 1a, 1b, 1c, and Little Naukati Salvage. Additionally riparian area or estuary area BMPs were applied in Four Leaf 436-61, Salty 2, Salty 5, Micro Sale 1, and Fork 1. In the units monitored, all buffers were implemented and there were no reported infringements or buffers lost in windthrow.

Table 2-16. Linear Feet/ Acres of Stream Channel Protected and Lakes Effected in FY 2002 monitored through implementation monitoring effort

Stream Class	100 % Monitoring Effort		10% Monitoring Effort	
	Linear feet of Stream Channel Protected/ Acres of Wetland Effected	Approximate Acres Retained as Streamside Buffer	Linear feet of Stream Channel Protected/ Acres of Wetland Effected	Approximate Acres Retained as Streamside Buffer
Class I	1,841 feet	5.7 acres	785 feet	2.7 acres
Class II	5,140 feet	18.65 acres	2,070 feet	4.65 acres
Class III buffered	2,900 feet	5.33 acres	300 feet	0.83 acres
Class III unbuffered*	750 feet			
Class IV	13,268 feet	2.3 acres	920 feet	
Beach buffer	0			

*Unbuffered Class III streams in units planned, laid out, and harvested under pre-1997 Forest Plan Standards and Guidelines

Culvert installation included sites at 9 Class I streams, 18 Class II streams, 8 Class III streams and 113 Class IV streams. Also installed were bridges and arch pipes (1/2 culverts with constructed footing foundations and natural stream bottoms). These sites included bridges constructed to cross 3 Class I streams, 5 Class II streams, and 1 Class III stream. Arch pipes were installed to cross 2 Class I streams and 1 Class II stream.

Comparison of the number of times the IDT applied the BMP relative to the 100% monitoring effort shows that the IDT monitoring was conducted on a high percentage of the sites where BMPs relative to riparian areas were applied. No departures from full BMP implementation nor corrective actions were reported in the IDT monitoring effort relative to the riparian and stream BMPs. Best Management Practice 12.6/ 12.6a Riparian Area Designation and Protection/ Buffer Zone Design and Layout and BMP 13.16 Stream Channel Protection were applied in timber unit harvest where as BMP 14.6 Timing Restrictions for Construction Activities/ Fisheries Prescription and 14.14/ 14.17 Design and Installation of Bridges and Culverts were applied in road construction and reconstruction.

Table 2-17. BMPs Relative to Riparian Areas, Streams, and Buffers Implemented as Tracked through Implementation Monitoring Effort

BMPs Applied	Number of Times the BMP was Appropriate for Use in 100 % Monitoring Effort	Number of Times the BMP was Appropriate for Use in 10% Monitoring Effort
12.6/12.6a	6	3
13.16	13	3
14.6	9	0
14.14/14.17	12	1
Totals	**40**	**7 (17.5%)**

No corrective actions were reported in FY 2002 associated with riparian areas, streams and buffers. This fiscal year no departures from full implementation of the Best Management Practices were reported. After reviewing the monitoring data, the following implementation notes were made in FY 2002. Highlighted in this data are the strengths and emphasis recommended by the IDT for FY 2003.

BMP 14.14/14.17 Design and Installation of Bridges and Culverts

Culverts and bridges were installed using methods to minimize sedimentation such as minimizing the amount of in channel excavation, end hauling excavated materials, and shaping slopes to gradients more shallow than the natural angle of repose of the fill material or natural contour. Turbidity measurements were taken at most sites where the structures were greater than 48 inches in diameter. Forest Service and ADFG concurrence was reached at all sites requiring fish passage and the concurrence details were implemented. This BMP was applied on the South Saddle, South Lindy, South Arm, and Four Leaf timber sale road construction/ reconstruction projects as well as on the 40000 Road, 6209 and 6350 road reconstruction projects, and Mitkof and POW Fish Pass Improvement projects.

All the culverts were designed and constructed to provide fish passage per engineering standards. The structures constructed and reconstructed on the timber sale contracts included implementation of in stream work in a manner to minimize disturbance, provide fish passage at resident and anadromous streams and in accordance with concurrence with ADF&G as required. The culverts reconstructed on the Mitkof and POW fish improvement projects were designed using stream simulation techniques and included rehabilitation of the stream channels. Installation at the Mitkof and POW fish pass improvement sites required dewatering, sediment control structures, and diversion channels during construction. At these sites, suspended sediment in the natural stream course was monitored through turbidity measurements. At some of these sites, the State Water Quality standard for turbidity was exceeded during and shortly following construction. Action to attenuate sediment transport was taken immediately at these sites. Mitigation and natural processes eventually contributed to decrease the turbidity to the natural levels. The timing of this construction was designed in a period to minimize impact to fish and none of these streams are utilized for any purpose beyond propagation of aquatic habitat and fish and wildlife. Construction at these sites was conducted in a staged process that included several starts and stops. No corrective action beyond this mitigation was reported.

Strengths noted during the IDT review included installation of two culverts at MP 4.6 and MP 4.7 on Road 6350 as part of the South Lindy Timber Sale showed effective implementation and minimum disturbance to the natural channel. These culverts showed adequate spacing and functional transport of water. The culverts were bedded well into the channel and gravels had actively been transported into and through the pipes. The turbidity measurements taken at these sites showed that the water met the State Water Quality Standards. Installation of two fish passage improvement culverts were monitored on the 40000 Road at MP 2.492 and MP 3.337 on the Mitkof project. These culverts were designed using a stream simulation technique. Detailed and comprehensive data on stream morphology was collected and used in the design of each site. This process appeared to result in effective implementation of culverts. Specific

design and construction of the stream substrate was implemented on this project. These structures were designed to provide fish passage at specified flows per Alaska Department of Fish and Game concurrence. The turbidity monitoring showed that the suspended sediment exceeded the levels defined in the State Water Quality standards at MP 3.337 periodically during construction. Mitigation measures were employed and contributed to bring the water into compliance with State Water quality standards. These mitigation measures and the rehabilitation of the stream to natural conditions contributed to improve the water quality. No emphasis items noted during the IDT review of the South Lindy sites or Mitkof. The turbidity monitoring that shows water quality exceeds the State Water Quality is an issue that should be further explored relative to water quality effectiveness monitoring.

Evaluation of Results

Best management practices are being successfully implemented on the Tongass National Forest. The high quality work of the individuals involved with preliminary site investigations, layout, unit and road design, environmental assessment, contract preparation, and contract administration has been reflected in the successful identification of streams and implementation of protective measures in units and effective culverts.

Successful implementation of BMP 12.6/ BMP 12.6a, Riparian Area Designation and Protection and Buffer Zone Design and Layout as well as BMP 13.16 Stream Channel Protection was accomplished. Streams were correctly identified on the ground and protective measures implemented. Monitoring showed that the buffers were implemented on required streams. Efforts to ensure buffers were intact through timber harvest included deleting areas adjacent to the buffers and designing logging systems to provide suspension and lift around the buffers. The buffers measured complied with the lineal requirements and exceeded the widths in most cases. In a couple cases monitored, Class IV streams were not correctly identified prior to sale administration but protective measures were implemented before harvest. Emphasis should continue to be focused on correct identification of streams in the environmental assessment and layout phases of unit harvest.

Successful implementation of BMP 14.14/14.17 Design and Installation of Bridges and Culverts was accomplished. Most of the work completed was culvert and bridge replacement work associated with improving structures to provide fish passage as well as hydraulic function. These culverts were generally designed following guidelines to provide fish passage with low-gradient slopes, minimum channel constriction, and outlet pools. The Forest and ADF&G reached concurrence for design and installation, prior to construction. Turbidity measurements were collected at most of these sites and the data collected

was obtained outside the designated collection time. Successive problems with turbidity were identified at some sites although most of these occurred during the 48-hour temporal period. These are discussed in Soil and Water section of this report. Additional focus needs to be placed on collecting turbidity measurements. During the IDT review, concern was raised over seeding the reconstructed contours at the culvert replacement sites. These sites showed bared soil slopes where seed had not germinated. Emphasis should be placed on turbidity levels monitored at the sites and respective mitigation and corrective actions as well as seeding bared soil slopes. Culverts have been prioritized for replacement following inventory and evaluation. The updated activity schedule for culvert replacement for fish passage improvements is included in Appendix C of this report.

Stream Channel/ Buffers Monitored

Successful prescription and implementation of stream protective measures were shown in the lengths and buffers adjacent to streams monitored. In FY 2002, significantly fewer units were harvested, and the units that were harvested represented less volume. In FY 2002, a total of 377.36 acres were harvested in 16 units compared to FY 2001 where a total of 2855.5 acres in 91units were harvested, and in FY 2000, 210 units on a total area of 5364.3 acres were harvested and monitored. Respectively, since less harvest occurred, the linear feet of stream channels protected and buffers implemented (and documented in the implementation monitoring process) were lower than the amounts reported in FY 2001 and FY 2000 for Class I, II, III and IV streams. In FY 2001, an increase in the number of Class IV streams were reported over FY 2000. The changes from FY 2001 and FY 2000 can be attributed to the increased emphasis on stream identification and specific location of the units relative to streams. Relative consistency was noted in the reporting procedures from FY 2000 to FY 2002.

Linear feet of stream channels protected and buffers implemented in FY 2000 were significantly higher than the amounts reported in FY 1999 and FY 1998. This reflects the difference in the location of the units, the number of units, and the monitoring process. A significant number of units were located adjacent to streams or had streams transecting the units. In 1998, streams adjacent to the unit, but outside the unit boundaries, were frequently considered outside the unit and the buffers were not documented during the implementation monitoring process. In FY 2000 through FY2002, these streams adjacent to units were added harvest unit area monitored. The implementation of the new standards and guidelines on streams has also contributed to increase the lineal feet and acres of stream protection documented.

Fish Habitat Question 3: Are Fish and Riparian standards and guidelines effective in maintaining or improving fish habitat?

Riparian and Aquatic Synthesis

The riparian and aquatic synthesis was initiated in 1999 to integrate monitoring efforts that are currently described as nine discrete fish habitat, soil and water, and wetland questions for Forest Plan monitoring. The Interagency Monitoring and Evaluation Group recognized the need for better coordination between monitoring efforts and synthesis of monitoring results. Resource data must be integrated in a watershed context in order to interpret watershed condition response to Forest Plan implementation.

An integrated watershed monitoring strategy is being developed for the Tongass National Forest that is consistent with the Forest Plan and responsive to the USDA Forest Service National Strategic Plan (specifically Ecosystem Health Goal, Objectives 1.a and 1.b). Stream, riparian, and upland attributes will be monitored in selected watersheds. These watersheds include case study watersheds[1] as well as other watersheds. The case study watersheds will be instrumented and intensively monitored. Established channel condition assessment, resident fish MIS, buffer effectiveness stream reaches, and future coho salmon MIS stream reaches will also be considered as suitable watershed "mouths" for integrating biological and physical watershed response indicators, but will probably not be fully instrumented due to funding constraints. Some of these watersheds will represent pre-Forest Plan management and will be explicitly treated as such during evaluation of results. Some monitoring activities will continue to be distributed throughout the Tongass National Forest, especially where statistical power is sought.

The establishment of these monitoring watersheds will facilitate synthesis of watershed products, values, and services into the broader ecological, social, and economic components of sustainability considered in the systems approach of the Montreal Process Criteria that the Tongass National Forest has adopted for organizing the annual Monitoring and Evaluation Report.

Progress in 2002

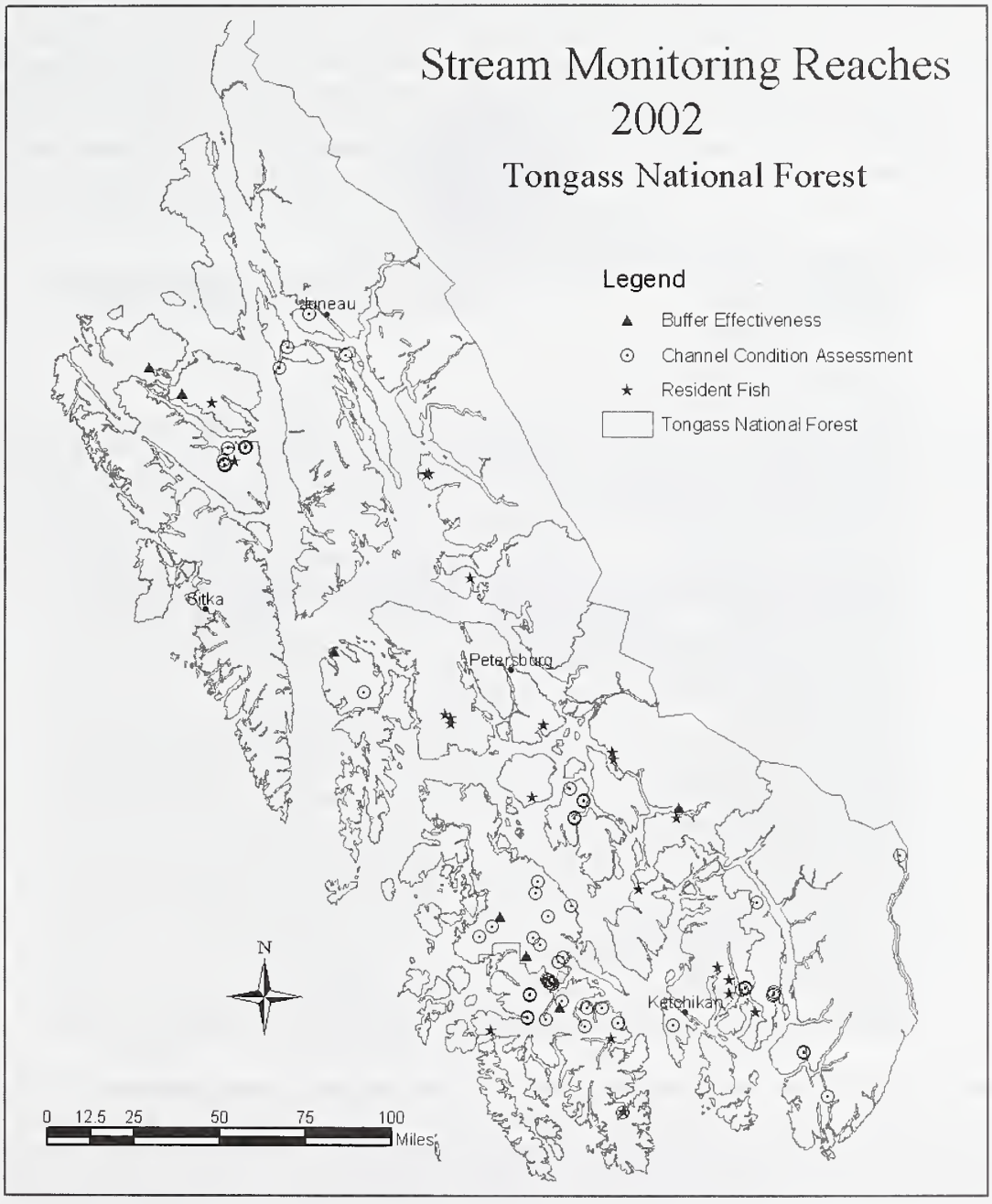
Progress and results for some of the individual components of the synthesis are presented in the Monitoring and Evaluation Report under specific monitoring questions. Progress on integrating the monitoring efforts is summarized here.

In 2002, the *Riparian and Aquatic Synthesis of Forest Plan Monitoring and Case Study Watersheds, Draft Study Plan* was written and distributed for review by the Forest Service (including Research) and other agencies. This document serves as the framework for the integrated watershed monitoring strategy. Comments will be used to develop and refine more detailed study plans in the future.

Spatial analysis of watershed data (physiography, harvest history, etc.) corresponding to a GIS point cover of about 100 established stream monitoring reaches (existing buffer effectiveness, channel condition assessment, and resident fish MIS reaches) has begun. Map 2-1 displays the established stream monitoring reaches in the Tongass National Forest. The sixty corresponding watersheds represent a continuum of management intensity from heavily harvested and roaded to pristine.

[1] Case Study Watersheds: This is a matched watershed set of three watersheds: two treatment watersheds with future harvest plans (one with no existing harvest/roads, one with a relatively high level of existing harvest/roads) and one control watershed with no existing harvest/roads and no future harvest/road plans. The Treatment 1 watershed will provide a "clean slate" for pre- and post-treatment monitoring of the current Forest Plan standards and guidelines. The Treatment 2 watershed will provide data to evaluate cumulative watershed effects resulting from past management, as well as some indicators of trends associated with future management (including restoration). Data collection and evaluation in these watersheds will improve our understanding of watershed processes and the cause and effect relationships that will be brought to bear in effectiveness monitoring.

Map 2-1. Stream Monitoring Reaches in the Tongass National Forest



In addition to the integration of upstream watershed data for each stream monitoring reach, the GIS cover facilitates evaluation of how well these stream reaches (and their contributing watersheds) represent the total population of watersheds across the Tongass. Because we are not using a random sampling strategy for selecting the reaches/watersheds, the implicit limitations of the monitoring results must be determined. Most of the sites were selected because of ease of access associated with cost and accessibility. The resident fish sites, for instance, were selected from planned timber sale areas. The buffer reaches monitored; however, incorporated some random selection. The ecological subsections (Nowacki, et al, 2001) will be used for this purpose. The subsections provide a way of stratifying SE Alaska into units with similar ecological processes. The subsections can be used as a coarse screen to better understand the ranges and influences of climatic, geologic, geomorphic, and other ecological considerations important to watershed monitoring. If subsections undergoing active management are under-represented, we may consider adding more watersheds in these areas. Although this evaluation has not been completed, Table 2-18 displays the subsections containing stream monitoring reaches.

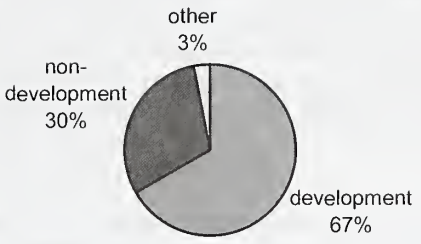
Table 2-18. Number of Stream Reaches per Subsection

Subsection Name	Number of Monitoring Stream Reaches
Behm Canal Complex	1
Central POW Till Plains	1
Central POW Volcanics	25
Clarence Strait Volcanics	1
Eastern Passage Complex	5
Etolin Granitics	3
Freshwater Bay Carbonates	2
Hetta Inlet Metasediments	4
Holkham Bay Complex	5
Kook Lake Carbonates	10
Misty Fjords Granitics	4
Peril Strait Granitics	5
Point Adolphus Carbonates	1
Princess Bay Volcanics	7
Rowan Sediments	2
Skowl Arm Granitics	3
Soda Bay Complex	1
South POW Granitics	2
Stephens Passage Marine Terrace	4
Stephens Passage Volcanics	1
Stikine Strait Complex	1
Sumner Strait Till Plains	4
Traitors Cove Metasediments	3
Wrangell Narrows Metasediments	1
Zimovia Strait Complex	3
TOTAL	**99**

It is also important to understand how these stream reaches and their corresponding watersheds are likely to be affected by future Forest Plan implementation, specifically roads and timber harvest. Figure 2-3 displays the distribution of these reaches among the Forest Plan Land Use Designations (LUDs). Most of the stream monitoring reaches (and their watersheds) are within LUDs that allow timber harvest and road construction. Most of these watersheds contain older timber harvest and roads that are not necessarily consistent with current Forest Plan standards and guidelines (e.g., riparian harvest). Twenty-seven of these watersheds could be considered for evaluation of pre- and post-treatment effects, since they contained no existing roads or harvest when the reaches were established. This subset includes most of the resident fish monitoring reaches.

The reaches within non-development LUDs (such as Wilderness) reflect pristine watershed conditions. The reaches classified as "other" are within Semi-remote Recreation LUDs where active road use occurs, but are otherwise relatively pristine (See Figure 2-3).

Figure 2-3. Percentage of Reference Reach Sites within Each Land Use Designation Categories



A comparison of the established stream monitoring reaches and Forest Plan activity since 1997 indicates that harvest has occurred since 1997 ten of the contributing watersheds (upstream of eleven stream monitoring reaches) shown by district in Table 2-19. Only one of these projects (the Salty Timber Sale in the Salty watershed) is completely consistent with current Forest Plan standards and guidelines.

Table 2-19. Harvest and Contributing Watersheds

Ranger District	Watershed Name (Harvest since 1997)
Craig	Old Frank (2 reaches, one downstream of the other)
	Twelvemile
Ketchikan-Misty	Salty
Petersburg	Dean
	Tunehean
Thorne Bay	North Thorne
	Sal
	Shaheen
	South Fork of the Staney
Wrangell	King George

As data are collected in stream reaches selected for coho salmon monitoring in 2003, we will include these reaches in future evaluations of the overall distribution of stream reach monitoring efforts across the Tongass National Forest.

Case Study Watersheds

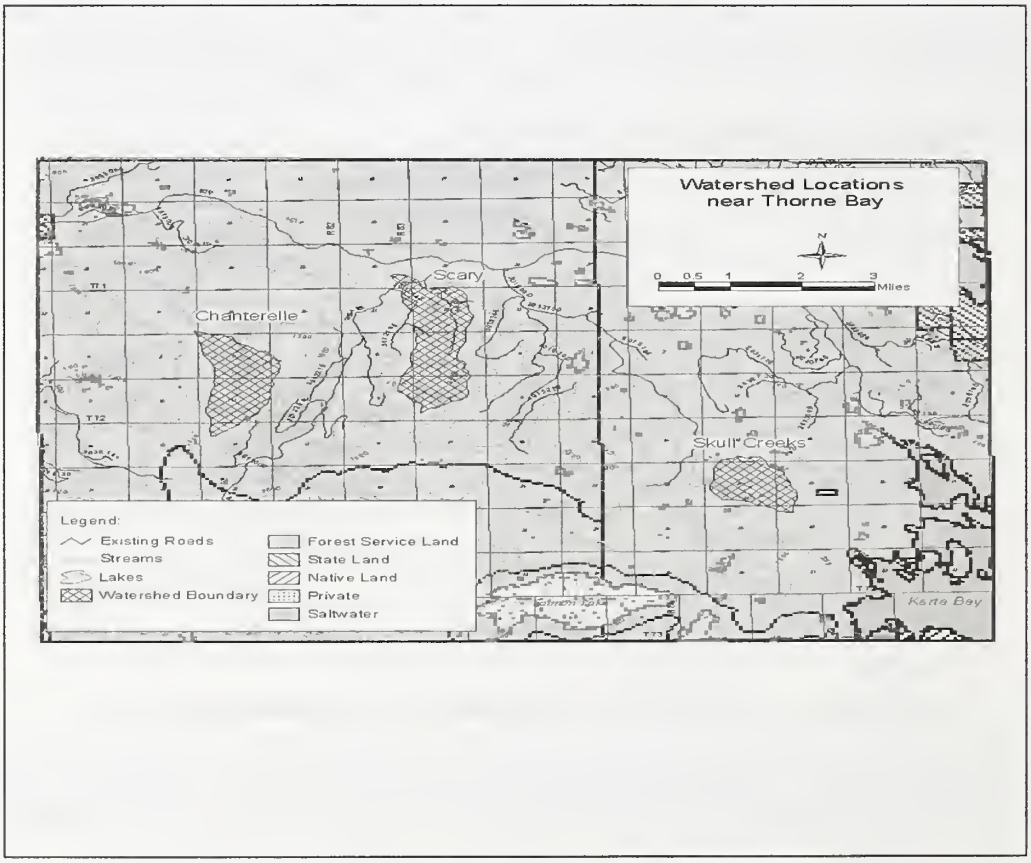
An important cornerstone of the watershed monitoring synthesis is the establishment of long-term case study watersheds. At the watershed scale, soils, wetlands, riparian areas, streams, water quality, and aquatic organisms are inextricably linked to each other. These linkages are spatially and temporally complex; our understanding of cause and effect relationships relevant to effectiveness monitoring is incomplete. Intensively instrumented and monitored, these watersheds will serve as case studies to improve our understanding of hillslope, riparian, and stream processes, how they are altered by forest

management activities, and how they ultimately influence fisheries. This information would provide a reference scale to evaluate attributes associated with the more broadly distributed stream monitoring reaches. The case study watersheds would also be suitable for pilot efforts of monitoring protocols that have not yet been developed.

We conducted a comprehensive forest-wide GIS screening to identify potential case study watersheds. About 50 potential Treatment 1 watersheds were identified that have reasonably good access for monitoring activities. Unfortunately, we could not find suitable Control watersheds (Control watersheds must be predominately non-development land use designations and currently un-harvested) for many of these. For example, there is no suitable Control watershed on Wrangell Island and very few on Mitkof, Zarembo, and North and Central Prince of Wales Island. Several potential Control watersheds were rejected for obviously dissimilar geology or other factors. Three potential case study watershed sets were proposed for field verification on Kuiu Island, Mitkof/Kupreanof Island, and Prince of Wales Island.

Field verification of the potential case study watersheds ruled out two sets primarily because they did not meet criteria for containing coho salmon populations, suitable stream monitoring reaches, or economic timber harvest potential. A proposal for one case study watershed set on Prince of Wales Island is underway.

Map 2-2. Chanterelle, Scary and Skull Creeks: Possible Case Study Watershed Sets near Thorne Bay



Continued search for potential case study watersheds will focus on evaluating matches for watersheds containing established resident fish MIS or channel condition assessment reaches.

Physical attributes (channel morphology, habitat) in stream monitoring reaches

Physical habitat surveys were repeated on twenty resident fish MIS reaches and one channel condition assessment reach in 2002. Further sampling of established buffer effectiveness and channel condition

assessment reaches was deferred pending development of a comprehensive study design and development of a quality assurance program.

We evaluated the physical stream attributes measured during stream buffer effectiveness, channel condition assessment, and resident fish MIS monitoring efforts to ensure their compatibility with the Forest Service's Alaska Region Stream Survey (USDA Forest Service 2001). Measurements are compatible with Tier III and Tier IV survey techniques. Key physical attributes (pools, large wood, etc.) measured at any of the three kinds of reaches are comparable. Through careful refinement and quality assurance, these data can be assimilated into a single database of response indicators for effectiveness monitoring. Ongoing statistical analyses of these data (Bryant and Caouette, in progress, Woodsmith et al, in progress) will be the basis for developing overall study designs including the most successful indicators, sample size, and sampling frequency.

Tongass National Forest habitat survey crews participated in a field test to evaluate the repeatability and consistency of Tier II stream survey measurements. This effort is a pilot for developing a quality assurance program for the Tier III and IV measurements used in monitoring. An initial look at these data underscores the need for focusing on quality assurance.

Forest Service scientists presented *Effectiveness monitoring protocols for floodplain channel aquatic habitat: findings and implications for future research addressing aquatic and riparian interactions* (Woodsmith, Bryant, and Edwards, in progress) to managers. The presentation focused on preliminary analysis of physical attribute data from the channel condition assessment reaches. This method is consistent and repeatable when conducted by well-trained crews and appears to effectively detect stream habitat changes as measurable responses in channel morphology, pool density and depth, and bed surface grain size distribution. Ongoing analysis is testing the success of discrimination of distinct habitat conditions along a gradient of watershed management intensity. Variability appears too large to support establishment of fixed target values (e.g., a specified number of pools per length of stream) for these attributes across the Tongass National Forest (Woodsmith et al, in progress).

In 2003, efforts will focus on quality assurance, study design, field measurements in established resident fish and new coho salmon stream reaches. Field measurements in other established reaches or new reaches (including case study watershed reaches) will be dependent on funding.

Biological attributes in stream monitoring reaches

Fish sampling methods have been fully developed and tested for both coho and resident fish Management Indicator Species reaches. Fish population data have been collected at least one year in 43 of the stream monitoring reaches. In 2002, efforts focused on re-sampling the resident fish reaches and identifying potential coho salmon monitoring reaches.

Three or four years of population abundance data have been collected in sixteen resident fish MIS reaches. An initial look at the data does not identify any consistent trends over time or relative to habitat features, except that generally pools are correlated with fish density.

Preliminary analysis of the salmonid populations sampled in channel condition assessment reaches generally found few statistically significant relationships between fish densities and physical channel attributes. A significant relationship appears between coho salmon fry and pool density (pools/stream length) (Woodsmith et al, in progress).

Established and proposed MIS fish monitoring efforts will continue to receive emphasis in Forest Plan monitoring. Fish MIS have been a primary criterion for selecting case study watersheds and will be sampled in suitable stream reaches when they are established.

Tongass National Forest personnel participated in logistical planning for the Environment and Natural Resources Institute (ENRI) sampling of aquatic invertebrates in 2002. The Alaska Department of Environmental Conservation funds this multi-year project with a grant provided by the Environmental Protection Agency. The objective is to calibrate a bio-assessment index for Southeast Alaska watersheds. ENRI sampled many of the watersheds containing established stream monitoring reaches. Data collection will continue in 2003. When the case study watersheds are established, we will sample aquatic invertebrates.

Other aquatic, riparian, and watershed attributes

Fish passage through culverts has been evaluated wherever road condition surveys have been completed. This information (as well as other information from the road condition surveys such as sediment sources) has generally not been assembled on a watershed basis and has therefore not been correlated to other monitoring efforts. In the future, we will evaluate road migration barriers and other problems in the case study watersheds, as well as upstream of monitoring stream reaches as applicable.

Although future plans call for limited water quality data collection in the case study watersheds, current water quality monitoring efforts are not generally relevant to the stream monitoring reaches due to differences in scale or location. Stream temperature sensors were installed in some resident fish MIS reaches in 2002 and may contribute to interpretation of population trends in the future. Some stream monitoring reaches are located in Prince of Wales Island watersheds upstream of where stream temperatures have been monitored since the early 1990s. An evaluation of these data is underway and will contribute to the development of a more strategic use of stream temperature in the context of Forest Plan monitoring.

Likewise, the turbidity data collected during culvert installation or replacement represents a single point in time and space and cannot be extrapolated beyond that scale with any reliability. Although it is useful as an instantaneous assessment of compliance with state water quality criteria and need for corrective actions, it has limited relevance to aquatic habitat at the reach or watershed scale. On Kupreanof Island within the Four Leaf TS, Rd 6314, Station 100+42, a large 10-15"x 10'8" culvert was installed. Recovery of turbidity was well within 48 hours and the water quality standards were not exceeded.

To date, riparian buffer stability monitoring has not begun in watersheds upstream of established stream monitoring reaches. We are aware of only one riparian buffer consistent with current Forest Plan standards and guidelines that has been implemented in any of these watersheds. The Salty Timber Sale included a unit with a riparian buffer upstream of the Salty resident fish MIS reach. This unit was harvested in 2002. Unfavorable weather prevented us from obtaining the baseline digital imagery necessary for buffer stability monitoring, so it is not included in the long-term buffer stability sample population. Buffer windthrow could have an immediate and dramatic effect on physical habitat attributes in the monitoring reaches and will require documentation and consideration in evaluating these data. We will continue monitoring riparian buffer stability as described in the Monitoring and Evaluation Report wherever riparian buffers are implemented, including case study watersheds and all of the watersheds corresponding to stream monitoring reaches.

We have not developed protocols for monitoring effectiveness of wetlands standards and guidelines. We expect to conduct pilot tests of these protocols in the case study watersheds.

The landslide inventory and corresponding GIS layers described in the Monitoring and Evaluation Report will serve as baseline information about this important watershed process. The inventory is complete (to various dates) for several watersheds corresponding to stream monitoring reaches. The inventory will need to be brought up to date for case study watersheds and any other watersheds with stream monitoring reaches. Landslides depositing sediment and debris upstream of these reaches may have immediate and dramatic impacts on physical and biological attributes in these reaches and will require documentation and consideration during data evaluation.

Recommendations

No corrective action with respect to the Forest Plan standards and guidelines for protecting fish, riparian, soil and water in the Tongass National Forest is recommended at this time. Very few projects consistent with the 1997 Forest Plan have been implemented to date. Very few monitoring results are available at this time and the opportunities to integrate monitoring results are extremely limited.

As monitoring watersheds are established, they will be considered as locations for pilot effectiveness monitoring protocols for wetlands, aquatic invertebrates, etc. Other protocols will be developed on a priority basis in the context of this integrated-watershed-monitoring program. Forest Service Research and other agencies are anticipated to participate in the prioritization and development of future monitoring protocols.

Actions underway in 2003 for the synthesis of aquatic monitoring results include the following:

- Evaluate ecological subsection representation of the stream monitoring reaches in the synthesis
- Incorporate data from newly established coho monitoring reaches in the synthesis
- Develop case study watershed proposal
- Develop quality assurance plan for habitat monitoring surveys
- Complete statistical analysis of habitat data
- Develop overall study design for habitat monitoring, including best monitoring indicators, sample sizes, and sample frequency
- Provide logistical support for aquatic invertebrate sampling
- Complete analysis of period-of record Prince of Wales stream temperature data in context of Forest Plan monitoring
- Coordinate aquatic monitoring activities upstream of stream monitoring reaches to ensure monitoring is conducted as necessary, especially for pre- and post monitoring sites

Stream Buffer Stability

The vegetation inherent in riparian areas is recognized as an important controlling factor and component in maintaining the natural range and frequency of aquatic habitat conditions. The Forest Plan contains several riparian standards and guidelines that are intended to retain the integrity of riparian management areas. These include: 1) maintain natural and beneficial quantities of large woody debris over the short and long term, 2) maintain stream banks and stream channel processes, 3) provide for the beneficial uses of riparian areas by maintaining water quality, and 4) maintain optimum salmon stream temperatures. By retaining riparian vegetation in a condition found within the range of natural variability, it is anticipated that these standards and guidelines can largely be achieved.

Windthrow is a natural and important phenomenon of Southeast Alaska. It recycles forest stands, and maintains and renews the forest ecosystem. However, timber harvest has the potential to exacerbate the rate of windthrow in adjacent forest stands, including riparian management areas, beyond that found within the natural range of variability. Monitoring the incidence of windthrow in riparian management areas and comparing that to windthrow found in control riparian areas will assess whether the buffers are retained in a condition found within the natural range of variability.

Figure 2-4. Low Altitude Aerial Digital Image of Riparian Management Area

Monitoring Results

A protocol to monitor the incidence of windthrow in Riparian Management Areas (RMAs) is described in the *TLMP Monitoring and Evaluation Guidebook*. This protocol monitors the incidence of windthrow in all riparian buffers of Class I, II and III streams on the Tongass National Forest that are associated with timber sales consistent with the Forest Plan. The number of trees felled and the change in canopy cover, due to windthrow, is documented and measured using low-altitude digital still aerial photographs.

Pre-windthrow baseline conditions are obtained after harvest of a unit but before the windthrow prone months of the year, which are typically the winter months, beginning in October. Repeated measurements of canopy loss due to windthrow are then obtained annually for the first five years after harvest and then again 10 and 15 years after harvest.

There are currently 60 RMA's in the sample population and they are located on 5 Ranger Districts and are associated with 14 timber sales and 27 harvest units. Twenty-seven of the monitored RMA are associated with harvest units harvested in 2000, 22 are associated with 2001 harvest and 11 of the RMAs monitored are associated with 2002 harvest.

Approximately 85 percent of the RMAs are adjacent to Class III streams (non-fish bearing, water quality streams). The remaining 15 percent of the RMAs are adjacent to Class I or II streams (anadromous and resident fish bearing streams). Approximately 23 percent of the RMAs are associated with harvest units that have been clearcut and have single age management structure. The remaining 77 percent of the RMAs are associated with harvest units that have some form of partial harvest silvicultural management structure. Retention of trees within the harvest units varies from none to approximately 75 percent.

Evaluation of Results

Post harvest windthrow is present in 8 (16%) of the 49 RMAs associated with harvest units harvested in 2000 or 2001. The incidence of windthrow, within these 8 RMAs, ranged from 3 percent to 77 percent of the total number of trees initially within the RMA (average 32%). All of the windthrow was within RMAs associated with harvest units harvested in 2000. RMAs that did not have windthrow one year following harvest also did not experience windthrow during the second year following harvest. In the RMAs that did experience windthrow, the majority of the windthrow happened during the first winter following harvest. Overall, 91 percent of the windthrow (194 trees) occurred during the first year following timber harvest.

The amount of windthrow is currently expressed only in terms of the number of trees felled by windthrow. The amount of windthrow will also be eventually defined by the change in canopy cover. To calculate the change in canopy cover, requires the low elevation digital images of the RMAs be registered to existing orthographic images so image scale can be calculated. Mid-elevation digital images are required as an intermediate step in this process. Mid elevation images have been obtained for a few of the RMAs and the remaining images are expected to be available next year.

The assessment of the incidence of windthrow within control riparian areas is currently incomplete. Monitoring the incidence of windthrow in the control areas, and comparing that to the incidence of windthrow within the RMAs associated with timber harvest, will assess whether the RMAs are retained in a condition found within the natural range of variability. Cursory review of the incidence of windthrow in control riparian areas indicate that windthrow has been exacerbated within the RMAs associated with timber harvest. Therefore, current windthrow management prescriptions established to maintain the RMAs within the natural range of variability have not been 100 percent effective. A better understanding of the complex relationship between spatial and structural variables and riparian windthrow is expected through the continuation of this monitoring effort. This better understanding will provide more effective windthrow abatement prescriptions and management will move closer toward desired riparian conditions.

These results represent the second year of a multi-year study. In addition to the need to monitor windthrow over time, it is also important to represent the complexities of the multitude of spatial variables. To represent the spatial variables, this study strives to include in its sample population all RMAs associated with timber sales consistent with the 1997 Forest Plan. For the most part this has been achieved but with exceptions. To date, the sample population does not include several potential and eligible RMAs that were not included for a host of reasons. The RMAs currently excluded from monitoring include:

1) Those with harvest units that had not been completely felled by late September or were felled over multiple years.
2) Those where digital images were not obtained due to weather.
3) Those that experienced technical difficulties in processing the digital images.
4) Those that were not distinguishable on the low elevation digital image due to the streams narrow width, slight incision depth and large percent of tree retention within the harvest unit.

Fish Passage

Upstream Passage of Juvenile Fish at Road Crossings

FISH112 IV.G, Class I: Maintain, restore or improve the opportunities for fish migration.

FISH112 IV.G, Class II: Maintain, restore or improve the opportunities for the natural fish migration of resident fish where feasible.

Upstream migration is essential for many fish species in the Tongass National Forest. Anadromous fish (fish that migrate from the ocean to freshwater to spawn) require access to spawning habitat. Juvenile anadromous fish migrate during their freshwater life stage, seeking seasonal habitats. Resident fish (fish that spend their entire life in freshwater) also may migrate seasonally in response to food, shelter and spawning needs.

Providing for fish passage at stream and road intersections to ensure fish migration is an important consideration when constructing or reconstructing forest roads. Improperly located, installed or maintained stream crossing structures can restrict these migrations, thereby adversely affecting fish populations. These structures can present a variety of potential obstacles to fish migration. The most common obstacles are excessive vertical barriers, debris blockages, and extreme water velocities that inhibit fish passage.

Designing the crossing structure to fit the stream is key for attaining fish passage objectives and avoiding many unintended and undesirable impacts. Culverts that constrict the stream channel may cause excessive water velocity, excessive bedload deposition or rapid change in water surface profile at the inlet. Culverts installed at a gradient significantly different than the natural stream grade can induce stream head cutting upstream or excessive deposition of bedload at the culvert inlet. Culverts that do not retain adequately sized bedload may lead to excessive water velocities within the culvert. Culverts with excessive water velocities within them may release energy by eroding the outlet control, leaving the outlet perched.

Commonly used techniques to provide fish passage across roads include:

1) Maintaining the natural streambed through the use of bridges, and bottomless arch culverts.
2) Installing culverts that mimic and retain the natural stream characteristics of stream width, gradient, substrate and pool depth and spacing.
3) Installing culverts that are countersunk and at a flat gradient. This technique has limited application and is only effective where the natural stream grade is also flat and the water is pooled and backwatered, as is found in palustrine, estuarine and occasionally floodplain channels
4) Installing culverts equipped with a system of weirs or baffles. The complex hydraulics and poor bedload transport associated with baffled culverts require very careful design considerations if fish passage is to be retained over time.
5) Removing culverts and restoring the natural stream channel.

Standards and guidelines for the installation of drainage structures in fish streams have become more stringent through time as fish passage needs, particularly for juvenile fish, have become better understood. Many culverts installed in the past are not installed to current Forest Plan standards, thus many of these older culverts must be replaced or removed. The Forest Plan standards and guidelines

acknowledge the need to restore and improve the opportunities for fish passage through drainage structures regardless of when they were designed and installed. The Tongass National Forest has launched a comprehensive fish passage remediation project and active measures to restore and improve the opportunities for fish passage through these older structures have been implemented.

Monitoring Results

Fish passage standards and guidelines including drainage structure design criteria have evolved over time and are still evolving as information on fish swimming performance, fish movement patterns and culvert hydraulics is improved. Therefore, the assessment of the effectiveness of the standards and guidelines contained in the current Forest Plan can only be meaningfully conducted on drainage structures designed since the effective date of the Forest Plan (May 23, 1997). Seventy-four culverts have been identified as meeting the criteria of being recent installations subject to current fish passage standards and guidelines. A cursory evaluation of juvenile fish passage capability, as related to current standards and guidelines, was completed on 62 of the 74 identified culverts. The evaluation consisted of design review and post installation measurements of the physical characteristics of the culverts with respect to the stream morphology. The evaluated culverts were installed in 1997 through 2002 on 5 Districts.

The evaluation indicates that approximately 51 (82%) of the culverts have been installed in a manner that meets current juvenile fish passage standards and 11 (18%) of the culverts may not have been installed in a manner that meets current juvenile fish passage standards.

An intensive survey of the Tongass road system has been conducted to identify the location and fish passage conditions of all fish stream crossings. This inventory is part of the Alaska Region Road Condition Survey (FSH 7709.58). This survey is 99% complete on the approximately 3,600 miles of classified roads (roads determined to be needed for long-term motor vehicle access) and 60% complete on the approximately 1,500 miles of Un-Classified roads (roads not intended, or not yet determined, to be part of the forest transportation system and include temporary, unclassified and decommissioned roads). This survey, has to date, identified 2,863 fish stream crossings along classified roads and 243 fish stream crossings along Un-Classified roads.

An analysis of the fish passage capability at these stream crossings has been done and involves comparing existing conditions to today's standards. The vast majority of the drainage structures surveyed was installed before the implementation date of the current Forest Plan. Forest Plan standards stipulate that juvenile fish will have unrestricted upstream passage within a defined range of stream flows. The stream flow at the upper end of this range is the stream flow that exists two days before and two days after a peak flow. The peak flow that is used is the flow that statistically recurs about once every two years and is known as the mean annual flood. This upper limit stream flow, or "fish passage design flow," is unique for each stream since it is based upon the specific hydrologic characteristics of that stream. It has been estimated that streams in Southeast Alaska have flows at or below this design flow approximately 98% percent of any given year. Therefore, in effect current fish passage standards stipulate that juvenile fish be able to successfully swim through culverts approximately 98% of the year.

The basic challenge of evaluating fish passage capability at culverts is to determine and compare fish swimming performance against culvert hydraulic conditions across a range of stream flows. Analytical software, entitled "FishXing", has been developed by the Forest Service to assist with these calculations. This software is designed to allow the user to input various criteria important to fish passage and estimate the effects on the fish's ability to move through the culvert at different stream flows. Some of the input variables are fish swimming ability, culvert dimensions, roughness within the culvert and various streambed and culvert elevations.

To improve assessment efficiency, a Juvenile Fish Passage Evaluation Criteria Matrix (Table 2-20) was developed by a group of interagency, interdisciplinary professionals. The matrix increases assessment efficiency by creating a course sieve that quickly separates out the culverts that have conditions that can be assumed to meet standards from those that do not. It is then only necessary to do the more time intensive FishXing analysis on the culverts with less obvious fish passage conditions. The evaluation matrix stratifies culverts by type and establishes criteria thresholds for culvert gradient, stream

constriction, debris blockage, and vertical barrier at the culvert outlet (perch) specific to each culvert type. Each culvert is placed into one of the three juvenile fish passage capability categories.

- **Green Category:** conditions that have a high certainty of meeting juvenile fish passage at all desired stream flows.
- **Red Category**: conditions that have a high certainty of not providing juvenile fish passage at all desired stream flows.
- **Gray Category**: conditions are such that additional and more detailed analysis is required to determine their juvenile fish passage ability. This additional analysis includes use of the FishXing analytical software.

Table 2-20 provides the juvenile fish passage capability category by structure type for all fish stream crossings (includes culverts, bridges, fords, and locations where the crossing structures have been removed) currently and completely surveyed in Class I and II streams along both Classified and Un-Classified roads. This survey is ongoing and not all fish stream crossings have been located nor have critical measurements required for fish passage assessments been completed on all identified fish stream crossings. In summary, of the 2,791 fish stream crossings, on both Classified and Un-Classified roads, that have all necessary assessment measurements available, 50% are classified as “Green”, 46% are “Red” and 4% as “Gray”. Only streams that have had fish presence verified by sampling have been included in the analysis with the exception of some major streams with bridges that have a high probability of containing fish.

The matrix defines culvert outlet perch as the difference in elevation between the hydraulic control located downstream of the culvert and the elevation at the bottom surface of the culvert outlet. This approach provides a flow independent assessment of culvert perch and provides the maximum perch height possible, although, it may also provide unrealistic over-estimates of perch height.

The gradient of a culvert, its perch and its width to streambed ratio were not used as criteria for determining fish passage capability if the culvert was backwatered. A culvert was determined to be backwatered in palustrine channels if the bottom surface of the culvert inlet was lower than the water surface downstream of the culvert. This exception to the standard assessment protocol was implemented after site visits to palustrine channels containing culverts with the afore-mentioned conditions indicated no fish passage concerns. However, since culverts in palustrine channels are often blocked by beaver debris, any blockage was identified as a concern. A culvert in non-palustrine channels was considered backwatered if the bottom surface of the culvert inlet was more than 6 inches lower than the hydraulic control located downstream of the culvert.

Table 2-20. Juvenile Fish Passage Evaluation Criteria Matrix

STRUCTURE TYPE	GREEN CATEGORY Conditions assumed to meet passage standards for juvenile fish										RED CATEGORY Conditions assumed not to meet passage standards for juvenile fish				
	CRITERIA	Class I Crossings		Class II Crossings		CRITERIA	Class I Crossings		Class II Crossings		CRITERIA	Class I Crossings		Class II Crossings	
ROAD STATUS CLASSIFIED ROAD (C) UNCLASSIFED ROAD (U)		C	U	C	U		C	U	C	U		C	U	C	U
Bottomless pipe arch OR countersunk pipe arch AND 100% bedload coverage AND average substrate depth >=20% of culvert rise.	Culvert span to bed width ratio of 0.9 to 1.0 AND no blockage OR backwatered AND no blockage.	15	0	25	0	Culvert span to bed width ratio of 0.5 to 0.9 OR blockage >0% but <=10%.	2	0	3	0	Culvert span to bed width ratio <0.5 AND blockage >10%	0	0	0	0
Pipe arches >=3x1 corrugation AND bedload coverage< 100% OR average substrate depth <20% of culvert rise.	Culvert gradient <0.5% AND no perch AND no blockage AND culvert span to bed width ratio > 0.75 OR backwatered AND no blockage.	22	0	10	0	Culvert gradient between 0.5% - 2.0% OR perch >0.0' but <=4" OR blockage >0% but <=10% OR culvert span to bed width ratio between 0.5 to 0.75.	14	0	9	0	Culvert gradient >2.0% OR >4" perch OR blockage >10% OR culvert span to bed width ratio <0.5.	37	0	52	0
CMP <= 48" span, AND spiral corrugations regardless of bedload coverage.	Culvert gradient <0.5% AND no perch AND no blockage AND culvert span to bed width ratio > 0.75 OR backwatered AND no blockage.	67	0	79	1	Culvert gradient between 0.5% - 1.0% OR perch >0.0' but <=4" OR blockage >0% but <=10% OR culvert span to bed width ratio between 0.5 to 0.75.	6	0	26	1	Culvert gradient >1.0% OR >4" perch OR blockage >10% OR culvert span to bed width ratio <0.5.	163	2	824	10
CMP with annular corrugations >3x1 OR CMP with 3x1 spiral corrugations AND >48" span AND bedload coverage <100%.	Culvert gradient <0.5 % AND no perch AND no blockage AND culvert span to bed width ratio > 0.75 OR backwatered AND no blockage.	27	0	46	0	Culvert gradient between 0.5% - 2.0% OR perch >0.0' but <=4" OR blockage >0% but <=10% OR culvert span to bed width ratio between 0.5 to 0.75.	7	0	11	0	Culvert gradient >2.0% OR >4" perch OR blockage >10% OR culvert span to bed width ratio <0.5.	50	0	117	0
CMP with >= ½ x 2 2/3 corrugations OR CMP with 3x1 spiral corrugations AND >48" span AND 100% bedload coverage.	Culvert gradient <1% AND no perch AND no blockage AND culvert span to bank full ratio > 0.75 OR backwatered AND no blockage.	4	0	12	0	Culvert gradient between 1.0% - 3.0% OR perch >0.0' but <=4" OR blockage >0% but <=10% OR culvert span to bed width ratio between 0.5 to 0.75.	1	0	2	0	Culvert gradient >3.0% OR >4" perch OR blockage >10% OR culvert span to bed width ratio <0.5.	2	0	2	0
Baffled Culverts	Not Applicable	-	-	-	-	Baffled Culverts	6	0	16	0	Not Applicable				
Total Culvert Crossings		**135**	**0**	**172**	**1**		**36**	**0**	**67**	**1**		**252**	**2**	**995**	**10**
Bridges OR fords OR removed structures	No road fill caused blockage	469	82	416	126	Not Applicable	-	-	-	-	Road fill causing blockage. Water piping through road fill	0	1	18	8
Total Crossings		**604**	**82**	**588**	**127**		**36**	**0**	**67**	**1**		**252**	**3**	**1013**	**18**

Values express the number of fish crossings in both Class I and Class II streams which cross both classified and unclassified roads that are within each fish passage capability category as stratified by structure type.

These fish passage evaluation criteria are not culvert design criteria, because additional fish passage considerations may be required

Figures 2-5 and 2-6 illustrate the status of juvenile fish passage assessments for both Classified and Unclassified roads. In addition to culvert crossings, these figures include fish streams crossed by bridges, fords, crossings where the structures have been removed and those that have an incomplete set of assessment measurements available for them.

Along **classified roads** (Figure 2-5), 2,863 fish crossings have been identified; 34% of these are Class I streams and 66% are Class II streams. Approximately 44 percent of the crossings are assumed not to meet juvenile fish passage standards. This mostly includes the Red culverts but several removed culverts and log bridges were a barrier to juvenile fish passage due to bridge collapse and improper structure removal. The majority (80%) of the Red culverts are located in Class II streams. Approximately 42 percent of the crossings are assumed to provide fish passage. This includes Green culverts, fords and almost all of the bridges and removed structures. Approximately 4 percent of the crossings are Gray culverts and require more extensive analysis. Approximately 10 percent of the crossings have incomplete measurements.

Along **unclassified roads** (Figure 2-6), 243 fish crossings have been identified; 90 (37%) of these are Class I streams and 153 (63%) are Class II streams. Approximately 9 percent of the crossings are assumed not to meet juvenile fish passage standards. Approximately one-half of the crossings assumed not to meet passage standards are culverts while the other one-half are collapsed log bridges or improperly removed structures. The majority (86%) of the crossings assumed not to meet passage standards are located in Class II streams. Approximately 86 percent of the crossings are assumed to provide fish passage. This includes Green culverts, fords and most of the removed structures and bridges. Less than 1 percent of the crossings is Gray culverts that require more extensive analysis. Approximately 5 percent of the crossings are culverts that have incomplete measurements.

Figure 2-5. Juvenile fish upstream passage assessment. Percent of each stream crossing type in Class I and II streams along Classified Roads.

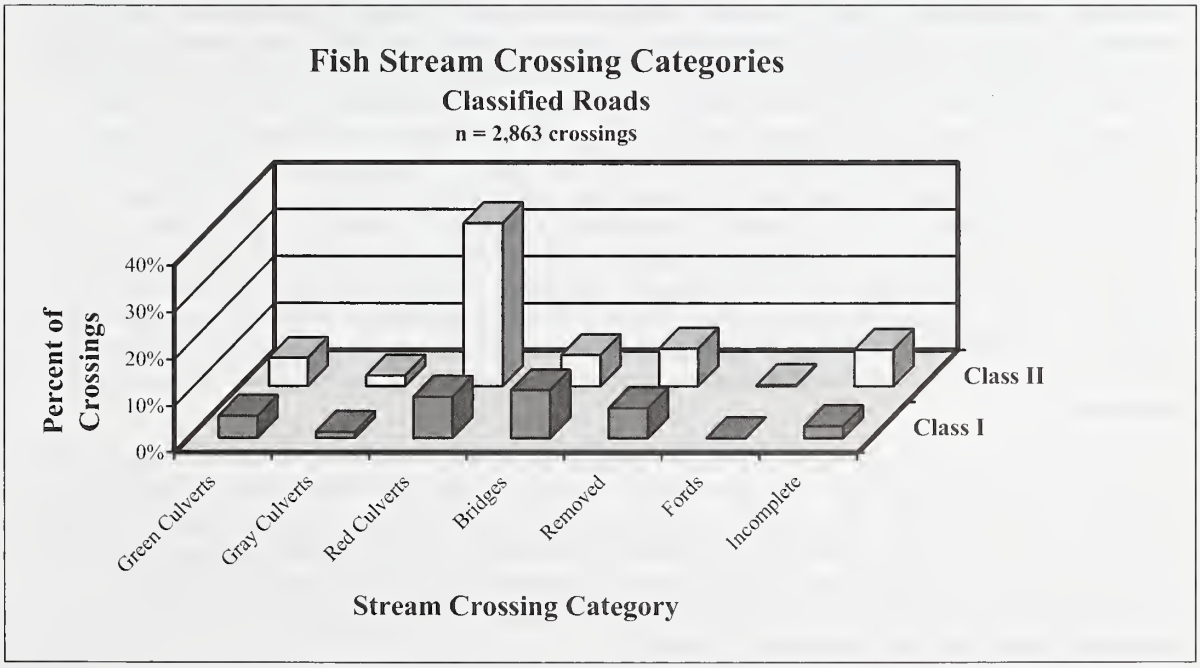
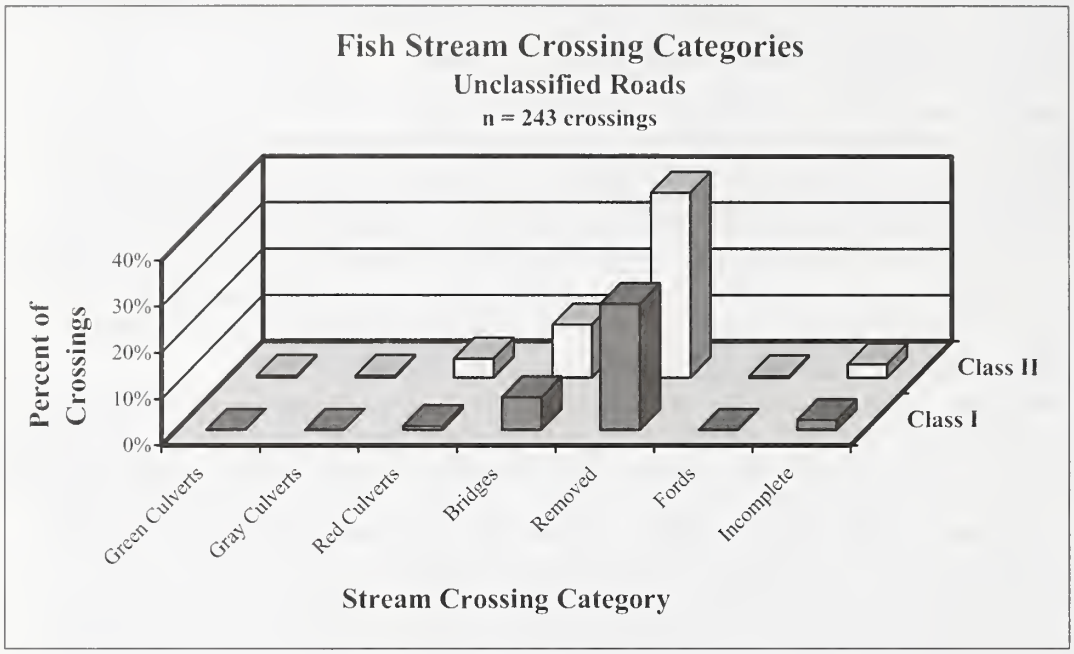


Figure 2-6. Juvenile Fish Upstream Passage Assessment, Percent of Each Stream Crossing Type in Class I and II Streams along Unclassified Road



Evaluation of Results

There is currently a strong initiative toward maintaining, restoring and improving fish passage along Tongass National Forest Roads. The initial inventory and survey of all fish streams and their passage conditions along Forest roads is nearing completion. Through the cooperation of an interagency group, a state-of-the-art fish passage assessment model has been developed and is being continuously improved. A set of interim design criteria for drainage structures in fish streams has been developed. Education and training opportunities are available for Forest personnel responsible for ensuring fish passage at road crossings. A research study that seeks to better understand the movement patterns, thus the passage needs, of headwater populations of cutthroat trout and Dolly Varden char is in progress. Results from this fish movement study will be used to evaluate the current fish passage standards. A process to establish a prioritized remediation schedule is currently being developed. Over 1,000 surveys that identify the quality and quantity of fish habitat upstream of impaired crossings have been completed. An improved approach to data management and project tracking is being developed. Fish passage remediation projects have been implemented. This includes removal of culverts along roads no longer required to remain drivable and the replacement of passage impaired culverts with state-of-the-art culvert installations.

It is important to emphasize that fish are assumed to be able to pass through most of the culverts identified in the Red and Gray categories most of the year. Most of these culverts do have fish located upstream of them. We are mostly concerned that passage may not be possible for juvenile fish during periods of high stream flow. The results presented are for juvenile fish passage, and it is likely that stronger swimming adult fish are not restricted in most of the structures. Field measurements are being used for the *FishXing* Software to analyze questionable streams and determine if adequate fish passage is provided.

The drainage structures assessed in this report for their consistency with current juvenile fish passage standards include drainage structures installed at various times with various fish passage design standards under the Forest Plan. Therefore, the results should not be necessarily interpreted to conclude that the reason for a specific structure not meeting the current standards is due to negligent structure design. The results do provide a baseline of current but preliminary fish passage conditions that can be used to track the commitment and progress toward maintaining, restoring or improving the opportunities for fish migration on the Tongass National Forest. Refinement of the culvert replacement priorities will continue to be based upon additional surveys of upstream habitat information.

This evaluation was a cursory review and requires additional more refined assessment to more accurately determine if juvenile passage standards have been met at new culvert installations. The cursory evaluation utilized the Juvenile Fish Passage Evaluation Criteria Matrix and is intended only as a course assessment process. It is not known if all the culverts assessed in this review were designed with current design criteria, or if they were, if the design was implemented. Therefore, this evaluation only assessed if existing culvert conditions were present which would provide for juvenile fish passage and does not necessarily assess the effectiveness of current design criteria.

An occasional, reoccurring problem with culvert installations in fish streams has been applying "typical" or standard designs without fully considering stream conditions. To provide fish passage, typical designs attempt to minimize culvert gradient. Several of the culvert installations inappropriately applied typical designs that resulted in the channel responding occasionally with severe stream head cutting upstream of the culvert.

The 11 culverts identified as potentially not meeting juvenile passage standards were installed before 2001. Culverts installed more recently have conditions that meet juvenile fish passage standards. This improvement is attributed to a greater awareness and incorporation of improved culvert designs. In recent years, a set of interim culvert design criteria have been developed, which better ensure that juvenile fish passage will not be impaired. These design criteria better recognize the importance of designing a drainage structure to fit the characteristics of the stream. In latter years, a greater emphasis has been placed on using stream simulation concepts in culvert design. Stream simulation includes embedding a culvert at natural stream grade, sizing it to the streams bank full width and backfilling it with streambed and riprap material to mimic stream characteristics. An advantage of stream simulation designs is that these designs are not dependent on the validity of assumptions pertaining to fish performance, stream hydrology and culvert hydraulics, as are hydraulic designs. Successful stream simulation provides the assurance that all fish species and life stages present are able to pass through the culvert with the same level of difficulty as that found in the natural stream channel.

Before and after photos of a culvert that was re-designed and re-installed in 2002 using stream simulation concepts to provide unimpeded fish passage.

The Forest Plan standards and guidelines acknowledge the need to restore and improve the opportunities for fish passage through drainage structures. The Tongass National Forest has launched a comprehensive fish passage remediation project and active measures to restore and improve fish passage have been implemented. A Forest-wide survey to identify the locations of fish stream crossings and existing passage conditions is nearing completion, a remediation schedule is being developed for stream crossings found not to meet current juvenile fish passage standards and fish passage remediation measures have begun to be implemented.

A cursory evaluation of the fish passage conditions at culverts installed since the effective date of the Forest Plan (May 23, 1997) was completed. Of the 62 culverts reviewed, it was found that 81 percent of the culverts provide effective juvenile passage. The remaining 19 percent have conditions that may not be providing juvenile fish passage at all desired stream flows. The culverts that may not be providing desirable fish passage were installed prior to 2001. More recent culvert installations were designed following state-of-the-art design criteria that better recognizes the importance of designing a drainage structure to fit the characteristics of the stream. Current fish

passage design strategy encourages and emphasizes the use of stream simulation concepts and criteria if stream conditions allow it. Stream simulation includes embedding a culvert at natural stream grade, sizing it to the streams bank full width and backfilling it with streambed and riprap material to mimic stream characteristics. Successful stream simulation provides the assurance that all fish species and life stages present are able to pass through the culvert with the same level of difficulty as that found in the natural stream channel. Stream simulation does not utilize Forest Plan defined fish design species and design flows that rely on assumptions of fish performance, stream hydrology and culvert hydraulics.

Several of the earlier culvert installations inappropriately applied "typical" designs that resulted in undesirable stream conditions. Typical designs attempt to minimize culvert gradient for the benefit of fish passage, but if the culvert gradient is substantially less than the natural stream gradient head cutting or excessive bedload deposition can result.

In summary, monitoring results indicate an encouraging trend toward improved fish passage at culvert installations. This trend is attributed to the application of improved design concepts and criteria. The tentative schedule for work associated with habitat survey and culvert replacements identified through the road condition survey is included in Appendix C of this report.

Heritage Resources

Goal: Identify, evaluate, preserve, protect, and enhance heritage resources.

Objective: Protect heritage resources (as described in the Heritage Resources Forest-wide Standards and Guidelines).

Background: The Forest Plan provides guidance on the management of the heritage resource program, including the identification, evaluation, protection, and enhancement of significant heritage resources. This guidance applies Forest-wide and on a project-specific basis pursuant to the National Historic Preservation Act, as amended, as well as other relevant acts and implementing regulations (including the Archaeological Resources Protection Act, the Native American Graves Protection and Repatriation Act, and the American Indian Religious Freedom Act). The Forest Plan heritage resources Standards and Guidelines address:

Project clearance/inventory;

Project implementation;

Mitigation; and

Enhancement.

The National Historic Preservation Act (NHPA) establishes a general framework for how federal agencies manage heritage resources. Section 106 of the NHPA requires federal agencies like the Forest Service to consider what effect an "undertaking" (project, activity or program funded in whole or in part under our direct or indirect jurisdiction) may have on heritage resources eligible for or listed on the National Register of Historic Places (National Register). When it is deemed necessary to complete a heritage resource inventory for an undertaking, archeologists usually check the condition of previously identified heritage resources within the project area. Each federal agency must establish a preservation program for the identification, evaluation, protection, and nomination to the National Register of significant heritage resources. Section 110 of the NHPA directs federal agencies to assume responsibility for the preservation of heritage resources that are eligible for the National Register and owned or controlled by the agency. To the maximum extent feasible, each federal agency must use National Register eligible properties available to it in carrying out its duties.

Since July 1995, we have met some of our heritage resource responsibilities under terms of a Programmatic Agreement (PA) with the Alaska State Historic Preservation Officer (SHPO) and the Advisory Council on Historic Preservation (Advisory Council). The Programmatic Agreement formalizes our compliance with Sections 106 and 110 of the NHPA and includes site and project monitoring standards. For example, Programmatic Agreement standards call for monitoring of project areas either during or after project implementation to judge the effectiveness of current models that predict the heritage resource potential for any given area of the forest. The Regional Forester signed a revised Programmatic Agreement in July 2002. The Programmatic Agreement incorporates 1992 amendments to the NHPA, one of the most notable of which enhances the role of Indian Tribes in the Section 106 consultation process.

Heritage Resources Question 1: Are Heritage Resources standards and guidelines being implemented?

The Forest Plan Standards and Guidelines are being implemented.

Monitoring Results

We evaluated 82 proposed projects, or undertakings, in FY 2002 for their potential to affect heritage resources eligible to the National Register. This compares to 60 undertakings reviewed in FY 2001. The increased number of reviewed undertakings may reflect the completed filling of heritage resource specialist jobs on the forest. We now have six full-time heritage resource specialists, an increase of one position since FY 2001. Qualified professionals using accepted professional standards administer the heritage resource workload. Contractors and project administrators are aware of heritage resource legal requirements. Monitoring suggests some sites

are being damaged not directly as a result of project implementation, but as remote areas become more accessible.

The FY 2002 results of the implementation of the Heritage Forest Plan Standards and Guidelines for the Tongass National Forest are displayed in Table 2-21.

Table 2-21. Results of Implementation of the Heritage Forest Plan Standards and Guidelines

Projects Reviewed For Their Potential To Affect Heritage Resources	Projects Reviewed Under Standard 36 CFR 800 Procedures	Projects Requiring Mitigation Other Than Avoidance	New Sites Located During Project Implementation	Site Enhancement
82	7	2	2	6

Project Inventory/Clearance

The standard consultation procedures outlined in 36 CFR 800 were followed for seven undertakings (less than 10 percent of all reviewed projects) before the signing of a NEPA decision memo. For the remaining 75 projects, we followed streamlined consultation procedures outlined in the Programmatic Agreement with the Alaska SHPO and the Advisory Council.

Project Implementation

Qualified heritage resource specialists supervised all project evaluations and inventories. Forest Service archeologists supervised most of these projects, while qualified contractors completed the few remaining projects. Included in all heritage resource reports is a statement indicating that if a heritage resource site is identified during project implementation the work will stop in that area and an archeologist and the District Ranger will be notified. No work shall proceed at this locality until the archeologist has completed necessary documentation and consulted with the Alaska SHPO, and possibly other consulting parties (Advisory Council, Indian Tribes, local governments, etc.).

As specified in our Programmatic Agreement, we continue to monitor project areas, generally after a project is completed, to determine if heritage resource site prediction models are effective. For example, road construction associated with the Shamrock Timber Sale on the Petersburg Ranger District continues through the central Kupreanof Island landscape. We toured the new construction, examining the freshly exposed soils along the road bank for buried archeological sites. None were discovered. So far evidence suggests the heritage resource prediction models are accurate and serve as a beneficial tool.

Mitigation

Avoidance of adverse effects is the preferred mitigation option for heritage resources. We achieved this goal for all but two undertakings during FY 2002. Removal of hazardous materials and closure of hazardous openings at the historic Gold Standard Mine (AHRS Site 49 KET 244) and structural maintenance to stabilize the historic Shelokom Shelter (AHRS Site 49 KET 409) required data recovery measures.

The Tongass National Forest adhered to provisions of the Native American Graves Protection and Repatriation Act (NAGPRA) dealing with intentional excavation and unintentional discovery of human remains. One inadvertent discovery of a site containing human remains occurred in FY 2002 on the Ketchikan/Misty Fiords Ranger District. We consulted with the appropriate Indian Tribes, the Alaska State Troopers and Coroner and decided to leave the remains in place and undisturbed. No funerary objects, sacred objects or objects of cultural patrimony protected by NAGPRA were discovered on the Tongass in FY 2002.

Enhancement

Public outreach is perhaps our best tool in protecting heritage resources for future generations. We monitor outreach to determine whether significant sites are managed to take advantage of their recreational and educational potential, while protecting the values that make them significant. Evidence suggests that interpretative and educational programs are effective in strengthening the public's commitment to heritage resource preservation and protection. Tongass archeologists made numerous classroom presentations throughout the school year, and completed outreach projects in cooperation with the University of Alaska-Southeast and other academic institutions. Public outreach leads to stewardship when the Forest visitor takes an active role in protecting sites. People protect what they understand and value. We reach thousands of people each year with the message that heritage resources are fragile, non-renewable resources and if protected can yield important information about past cultures and environments.

The Tongass National Forest advocates forest visitors to take an active stewardship role. Passport In Time (PIT), a popular national program, offers the public opportunities to work with archeologists on a variety of projects. Volunteers participated in several Tongass PIT projects during FY 2002, including several heritage resource site-monitoring projects. These PIT monitoring projects allowed us to maximize limited funding and monitor more sites than we would have otherwise.

The Sitka/Hoonah Ranger District archeologists led an inventory project in Port Althorp, a bay on north Chichagof Island that had no previously documented heritage resources. The team, including several PIT volunteers, determined precise locations for each newly discovered site using a Global Positioning System device. Site attributes and condition assessments recorded by the team will serve as a baseline for future monitoring visits.

In Sitka, six PIT volunteers gave 1,016 hours of their time to catalog artifacts from the Hidden Falls archeological site. Forest Service archeologists excavated this important multi-component site in the late 1970s and the artifact catalog system had not been revised or updated since. Dedicated volunteers examined the entire collection – all 10,500 items. They checked the descriptions, measurements, weights and provenience of each item and entered all relevant information on a new database. The result of this project is a more accessible and usable collection.

In May 2002, the Ketchikan/Misty Fiords Ranger District hosted a five-day PIT project in partnership with the University of Alaska Southeast Ketchikan Campus and the Ketchikan Indian Community, a local, federally recognized tribe. The 13 volunteers inventoried approximately 42

acres, recorded one new site and 13 culturally modified trees (CMTs), and monitored the condition of nine sites. None of the monitored sites exhibited looting, but all are experiencing natural erosion.

The Ketchikan/Misty Fiords Ranger District hosted a PIT site-monitoring project in July 2002. Forest Service archeologists and seven PIT volunteers conducted heritage resource inventories and site assessments using kayaks for transportation. The group monitored 18 sites, found and recorded ten new CMTs and seven new sites (including four new pictograph sites). The group surveyed 42 acres of upland area and paddled along 76 miles of coastline.

PIT volunteers and Ketchikan/Misty Fiords Ranger District archeologists stabilized the historic Shelokum Civilian Conservation Corp (CCC) Shelter during a June 24 - July 3, 2002, PIT project. Nationally recognized conservator Harrison Goodall, who originally assessed the shelter in 1992, supervised the 2002 work. The District's Heritage and Recreation staff groups, along with seven PIT volunteers, replaced failing structural features, using in-kind materials and traditional workmanship. PIT volunteers contributed almost 480 hours of labor.

During July 2002, PIT volunteers on the Thorne Bay Ranger District monitored and thoroughly recorded two ancient rock art sites and inventoried almost 400 acres of National Forest System lands. Very few rock art sites in southeast Alaska have been documented at this level. We expanded the number of known rock art designs from a couple of dozen to over 100. Collected information will serve as a baseline for future projects at the sites, hopefully in cooperation with Sealaska Heritage Institute. The group inventoried about 380 acres and recorded two new archeological sites, one historic site and quite a few CMTs. The PIT volunteers made a meaningful contribution to our understanding of rock art while contributing 450 hours during fieldwork and an additional 80 hours during report preparation.

Volunteers and Petersburg/Wrangell Ranger District archeologists visited several sites this year to assess site integrity and to identify changes that might have occurred over the past year. We inspected them, updated site maps and sometimes collected samples for analyses. Several of the sites received special attention. The Sumner Creek Fish Trap (49 PET 456) lies on a dynamic tide flat where we documented natural changes in the past five years. Wood fish trap stakes from the site have yielded radiocarbon dates almost 5,000 years old, surpassing all other southeast Alaska fish traps in antiquity. Since initial site monitoring, we have discovered three additional trap components including this year's discovery of a new stake alignment. We mapped its location and collected a stake for radiocarbon dating. The Sandy Beach Fish Trap (49 PET 027) has received regular monitoring visits over the last decade. Annually we take the Petersburg Elementary 3rd Grade classes to the site, along with Elderhostel groups, cruise ship passengers and others. Repeat visits to intertidal fish traps have revealed changes in sediment deposition and channel meandering. We have been able to note these changes and have discovered site complexities as a direct result of monitoring.

An anthropology student from Humboldt University volunteered for the Petersburg/Wrangell Ranger District this summer. We monitored numerous sites with her help, including shell middens and fish traps. Our volunteer also aided us during site inventories and helped us update our site database, an essential tracking and evaluation tool.

Internal Training

Combining heritage resource monitoring with other forest resource monitoring provides us an opportunity to familiarize natural resource specialists with the forest's heritage resources. With declining budgets, archeologists utilize these programs to expand inventory coverage, provide training and conduct additional site monitoring. For example, in early July 2002, the Craig Ranger District archeologist and recreation planner joined forces to monitor high use areas within the South Prince of Wales Wilderness. Thirteen archeological sites were monitored during this trip.

The Ketchikan/Misty Fiords Ranger District archeologists hosted three internal training programs to monitor sites and conduct coastal site inventories. Two of the internal training programs consisted of slide-presentations illustrating common site types, demonstrations of how to recognize and report site damage and discussions of site stewardship. In FY 2002, District staff

inventoried and monitored heritage resources on Duke and Mary Islands. The combined crew focused their work around the mouths of streams, within estuaries and above beaches that "looked" favorable for traces of earlier people. Inventory coverage extended from the intertidal zone inland along uplifted coastal beach terraces and included Tlingit place name locations. Ultimately, the crew monitored five sites, documented two new sites and tested a previously known site; accomplishing inventory of about 115 acres and investigating approximately 17 miles of the coast by kayak. None of the sites exhibited human-caused impacts, but all are experiencing natural erosion.

Petersburg/Wrangell Ranger District archeologists collaborated with District recreation managers on a joint fieldtrip to the northeast shore of Kupreanof Island. Recreation managers visited potential recreation campsites and recorded environmental information about each locality. We monitored the archeological resources along the coast and discussed management approaches focusing on site stewardship ethics. Similarly, we visited sites with other Forest Service employees to introduce them to the variety of heritage resources. Our education program provides Forest Service workers with the background necessary to detect site damage should they encounter heritage resources during their work.

During investigations for a Shoreline Outfitter Guide environmental analysis, Sitka/Hoonah District archeologists visited proposed recreation sites with other Hoonah District recreation and law enforcement personnel to introduce them to various heritage resources.

This year Wilderness kayak rangers from Juneau Ranger District expressed an interest in assisting in site monitoring. The zone archeologist provided the rangers information about heritage resources, which they used to monitor sites within the areas they normally patrol. The rangers collected site information, photographed sites and obtained precise site locations using a Global Positioning System device. The rangers noted their enhanced ability to provide the public with accurate heritage resource information.

Native Collaboration

The Ketchikan-Misty Fiords Ranger District initiated a site guardian or stewardship program with local Indian Tribes and clans. Tribal representatives visited a number of traditional sites and discussed current management issues that included recreational use, timber harvest and other multiple use activities and their potential impacts to these resources. Tribal elders and others have been discussing sacred and traditional sites with the district archeologist and suggesting protocols for defining, identifying and protecting sensitive areas. These consultations directly involve knowledgeable Alaska Native people in the Heritage Program and the NEPA planning process.

This information will significantly increase our ability to protect sensitive areas and avoid conflicts in future planning. Inventory and monitoring funds are critical to this effort.

We are also taking steps to proactively manage the forest's significant heritage resources. Two projects begun in FY 2001 are designed to outline management strategies for two distinct types of heritage resources; historic mines and culturally modified trees. The Alaska Region contracted for an assessment of mining development that occurred between 1850 and 1950. This report provides a historic background of mining activity and criteria for determining eligibility of mining sites to the National Register. This information will be useful for expediting heritage resource management decisions in anticipation of future clean up of remaining hazardous materials at abandoned mines.

The Tongass forest archeologist continues to draft a culturally modified tree (CMT) management plan. CMTs are perhaps the most common visible signs of Southeast Alaska's occupation by Alaska Native peoples. The study of CMTs can provide answers to important questions about chronology, technological development, subsistence, seasonality, settlement patterns, land-use patterns and regional trade and interaction. As a cultural resource class, precedence for their inclusion in the National Register has been established. The draft CMT management plan presents a management strategy that includes suggested inventory procedures, recording methods, criteria for determining National Register eligibility and a range of preservation and mitigation standards. The plan incorporates detailed CMT attribute data collected from inventory of over 10,000 acres of the Tongass. We intend to solicit comments on the draft plan from Indian tribes, Alaska Native people and others interested in CMT management. We have also identified the need for future management plans dealing with other heritage resource sites, such as ancient shell middens, historic cabins, and canneries.

Evaluation of Results

The USDA Forest Service - Alaska Region has developed heritage resource management procedures to efficiently and economically carry out its obligations under Sections 106 and 110 of the National Historic Preservation Act. These procedures are outlined in a revised programmatic agreement. Archeological inventory is prioritized by the likelihood of locating heritage resource sites. This likelihood is based upon an area's physical, biological, and cultural features and known history. The Tongass National Forest recognizes two archeological sensitivity zones, high and low. Archeological inventory for proposed activities is concentrated primarily in the high sensitivity zones. However, some inventory is also conducted within areas of low sensitivity. The sensitivity zones are subject to refinement as new information becomes available and the zones are flexibly applied in the field. Post-project monitoring on roads and within other activity areas is accomplished to verify the assumptions of the sensitivity model and to determine whether heritage resources are present but not revealed by standard inventory techniques.

We should continue heritage resource monitoring to ensure that Forest Plan standards and guidelines are continually met. Since 1997, we have made significant progress in implementing standard monitoring procedures and increasing the number and frequency of monitoring inspections. However, we have only inspected a few of the total number of heritage resource sites on the Forest. The total number of damaged sites that have been stabilized is few. Funding and personnel limit additional stabilization, and/or data recovery efforts. The monitoring questions are relevant and elicit information that is essential for monitoring Forest Plan objectives.

Heritage Resources Question 2: Are Heritage Resources standards and guidelines effective in protecting heritage/cultural resources as expected in the Forest Plan?

The Forest Plan standards and guidelines are effective in meeting resource objectives, i.e. site protection and preservation.

Monitoring Results

Project Implementation

Current evidence suggests that Forest Plan standards and guidelines are effective in protecting heritage resources. The Tongass National Forest has a strong record of compliance with Section 106 of the National Historic Preservation Act (NHPA). During FY 2002, Heritage Program staff evaluated 82 undertakings for their potential to affect heritage resources eligible to the National Register. Avoidance of project impacts continues to be an effective mitigation approach.

Project Inventory/Clearance

Overall the Tongass National Forest meets our legal compliance requirements and completes heritage resource effects analysis prior to making a NEPA project decision. We have developed an effective system to ensure that every undertaking is considered for its effects to heritage resources. Our challenge is to maintain this level of effectiveness as new employees, some with no knowledge of legal compliance requirements of heritage resource laws, take responsibility for programs that result in undertakings as defined by Section 106 of the NHPA. Ongoing internal education with key staff groups is crucial in this effort.

Mitigation

Site monitoring suggests project mitigation measures are effective in protecting heritage resources eligible to the National Register. The site monitoring is very detailed in some cases and specifically details how the site should be monitored for natural and human-caused effects.

Monitoring Results

Tongass archeologists monitored the condition of 160 heritage resources, many times in conjunction with project inventory (Table 2-22). In addition to monitoring sites on National Forest System lands, we regularly inspect sites on State tidelands and Alaska Native corporation lands (regional and village) as a courtesy and to gauge the overall level of site impacts. Archeologists noted natural or human-caused impacts at five sites, one of which is completely or partly on National Forest System lands. The remaining 155 sites appear to be in a state of natural decomposition with no evidence of accelerated natural erosion or human damage.

Table 2-22. Results of the FY 2002 Tongass National Forest Heritage Program Monitoring Efforts

Sites Monitored	Sites Eroding Normally	Sites with Accelerated Erosion	Sites Vandalized	Sites Damaged from Previous Forest Projects
160	155	2	3	0

Vandalism to heritage resources occurs primarily in the form of illegal artifact collecting and excavation of buried cultural items. The Archaeological Resources Protection Act states that people may not "excavate, remove, damage, or otherwise alter or deface any archeological resource located on public lands or Indian lands..." unless that activity occurs under terms of a permit. Evidence of vandalism was noted at three sites in FY 2002, one of which is on National Forest System lands. The other vandalized sites are on Sealaska Corporation lands.

The statistical results of the FY 2002 monitoring program indicate that of the 160 sites monitored, about 97 percent are either undisturbed or deteriorating from natural processes (e.g. organic decomposition, soil compaction), while about one percent of the sites are being impacted from accelerated erosion. Archeologists noted vandalism at about two percent of the monitored sites, while none of the monitored sites exhibit damage from previous Forest Service activities. Most of the human-caused damage occurred before implementation of the Forest Plan standards and guidelines for heritage resources. Evidence suggests the standards and guidelines have been effective in reducing the level of human-caused damage to heritage resources.

Table 2-23. Tongass National Forest Heritage Resource Sites Monitored in FY 2002

USGS QUADRANGLE	NUMBER of SITES EXAMINED
BRADFIELD CANAL	3
CRAIG	26
DIXON ENTRANCE	11
JUNEAU	6
KETCHIKAN	48
PETERSBURG	34
PRINCE RUPERT	2
SITKA	18
SUMDUM	11
YAKUTAT	1

Sealaska Corporation owns two of the vandalized sites listed in Table 2-23. Tuxekan Village (49 CRG 041) continues to attract collectors who dig small holes on the terraces where houses stood 90 years ago. At the Whale Pass Petroglyph Site (49-PET-107) "MAX" continues to etch his name in the rock next to the prehistoric designs, perhaps every other year. Site 49 SIT 265, recorded and last visited 20 years ago on Admiralty National Monument, consists of the surface remains of "burnt and pulverized large mammal bones". The remains were not located on the day the site was monitored. It is unknown if this site has been weathered, eroded, vandalized, or disturbed by animals.

The Lost River Fish Trap (AHRS Site 49 YAK 079), on the Yakutat Ranger District, is actively eroding out of the riverbank. When first recorded several years ago, we made an effort to remove and preserve the trap. The trap's removal from its current location is complicated by its size and fragile nature. No curatorial facility is available to take on the stabilization and curation of such a large and fragile item. In an effort to protect and preserve the 400 year-old remains, we decided to leave the remaining trap in place and cover it with river silts. The remains need to be removed from the riverbank or additional data recovery efforts made to record this fragile item given the potential flooding event periodically posed by the advance of the Hubbard Glacier.

Site 49 SUM 066, a small shell midden on the Juneau Ranger District, was located and recorded during a Section 106 review prior to issuing a Special Use Permit in 1995. The SHPO concurred with our determination that the site was eligible for the National Register and that it be monitored annually. FY 2002 was the first year the site has been monitored since 1995. The site was eroded through the placement of a pile of firewood outside of the permitted area. The permit holder has now been informed of the location of the midden and directed to avoid the site. In the future, the Special Use Permit administrators and Heritage Program personnel intend to work together and monitor the site annually to ensure permit compliance.

The Heritage Program for Juneau Ranger District, Yakutat Ranger District and Admiralty National Monument has been managed out of the Sitka office for over 20 years. This has resulted in sporadic site monitoring on these districts. Dispersed sites were often not monitored due to lack of personnel, funding and available time. Monitoring has been completed opportunistically - when in the vicinity of a site while working on another project. This strategy has resulted in many of the same sites being monitored repeatedly while other sites are rarely visited. Additionally, access to sites influences the frequency of the monitoring efforts. Sites in the vicinity of roads or communities are visited more often than sites that are hard to reach or require helicopter or plane access. Some sites, those in the Mitchell Bay Watershed and Mole Harbor monitored this year, had not been visited since 1981, the last year that a District Archeologist was on staff at the Juneau Ranger District and Admiralty National Monument. The Heritage Program currently has an archeologist on staff in Juneau responsible for the oversight of the Heritage Program on these districts. This should increase the number of sites and frequency of monitoring visits in the future.

Evaluation of Results

The Forest Plan standards and guidelines are being implemented and they do appear to be effective in meeting resource objectives, i.e. site protection and preservation. There is a need, however, to continue heritage resource monitoring to ensure that the standards and guidelines are continually met. We have in the past six years made significant progress to develop standard monitoring procedures and increase the amount of monitoring inspections. However, we have inspected only a relatively few of the Forest's heritage resources. The total number of damaged sites that have been stabilized is few. Limited amounts of funding and personnel restrict additional stabilization and data recovery. The Forest Plan monitoring questions are relevant and elicit information that is essential for monitoring Forest Plan objectives.

Since FY 1997 576 heritage resources have been monitored on the Tongass National Forest. This represents almost 30 percent of the known and recorded heritage resources on the forest. The number of monitored sites is a much smaller percentage of all the forest's heritage resources, however, since many of the forest's heritage resources have not been discovered or recorded. Monitoring suggests that Forest Plan revision standards and guidelines for heritage resources are being implemented. Generally, heritage resources on the forest are receiving the protection envisioned in the standards and guidelines. Monitoring indicates most heritage resources on the forest are experiencing normal rates of soil erosion or deposition and low rates of human-caused impacts. Many of the forest's heritage resources are buried below the forest duff and inconspicuous. Sites experiencing elevated levels of human impacts tend to be more visible or are known as heritage sites.

Table 2-24 shows that 402 sites (about 70 percent of the total) have been visited one time since 1997. A total of 100 sites (17 percent of the total) have been visited twice, 36 sites have been visited three times (6 percent of the total) and 38 sites (7 percent of the total) have been visited four or more years. Many of the sites monitored multiple times are near communities and frequently visited by the public. Other sites monitored multiple times have previously displayed some form of deterioration, warranting an increased level of monitoring. Some of these sites are visited opportunistically, especially when they are good examples for educational and stewardship program visits.

Table 2-24. Number of Years Heritage Sites Monitored and Visitation Statistics

	NUMBER OF YEARS MONITORED						TOTAL SITES
USGS QUADS	1	2	3	4	5	6	
Bradfield Canal	6	3	1	0	0	0	10
Craig	56	12	9	8	5	6	96
Dixon Entrance	5	8	2	2	3	0	20
Juneau	24	2	2	0	1	0	29
Ketchikan	89	26	8	1	1	0	125
Mount Fairweather	3	0	0	0	0	0	3
Petersburg	87	19	4	4	1	5	120
Port Alexander	37	12	6	0	0	0	55
Prince Rupert	4	0	0	0	0	0	4
Sitka	56	7	4	0	1	0	68
Skagway	3	1	0	0	0	0	4
Sumdum	23	6	0	0	0	0	29
Yakutat	9	4	0	0	0	0	13
TOTAL SITES	402	100	36	15	12	11	576
Percent of Total	69.8	17.3	6.3	2.6	2.1	1.9	100%

Monitored sites with no evidence of looting may remain undisturbed because their locations are confidential or not widely known. Inconspicuous sites may be less vulnerable because of the perceived notion that they are less likely to contain the type of artifacts that are fashionable to collect. It is also possible that site protection efforts have discouraged impacts from the public.

We can derive several conclusions from monitoring. Abandoned Alaska Native villages, saltery and cannery sites, cabin and mining sites are the kind of sites where most disturbance has been observed. Most of these sites are well known, listed as villages, canneries, ruins, etc. on USGS maps, nautical charts or in other publications. Many of these sites are on private land. These sites often contain items popular to collect, such as bottles, beads, china, opium bottles, rice bowls as well as other prehistoric and historic artifacts. Looted sites also tend to have visible site features

Despite the apparent low levels of human-caused impacts we need to maintain current monitoring efforts in site protection. We should involve private landowners/managers in protection measures for sites we inspect out of professional courtesy. Stewardship programs and education programs should continue to be a priority. We are reaping the benefits of working with young people since 1990 who are now in leadership positions with Tribal and local governments. We really need to increase inspections, studies, stabilization and/or data recovery, and management plans for all site types.

The additional inventory funded through Forest Plan monitoring have located numerous undocumented sites and culturally modified trees. These funds also generated an ongoing Culturally Modified Tree Study and a Rock Art Summary/Study. During FY 2002, these funds enabled the completion of several Passports in Time programs, and several internal training programs with Wilderness Rangers and others. These programs provide public education and stewardship opportunities, and are responsible for facilitating much of the survey, monitoring and documentation during the past six years. These significant contributions to stewardship through public involvement and the protection and inventory of heritage resources would not have been as complete without this support.

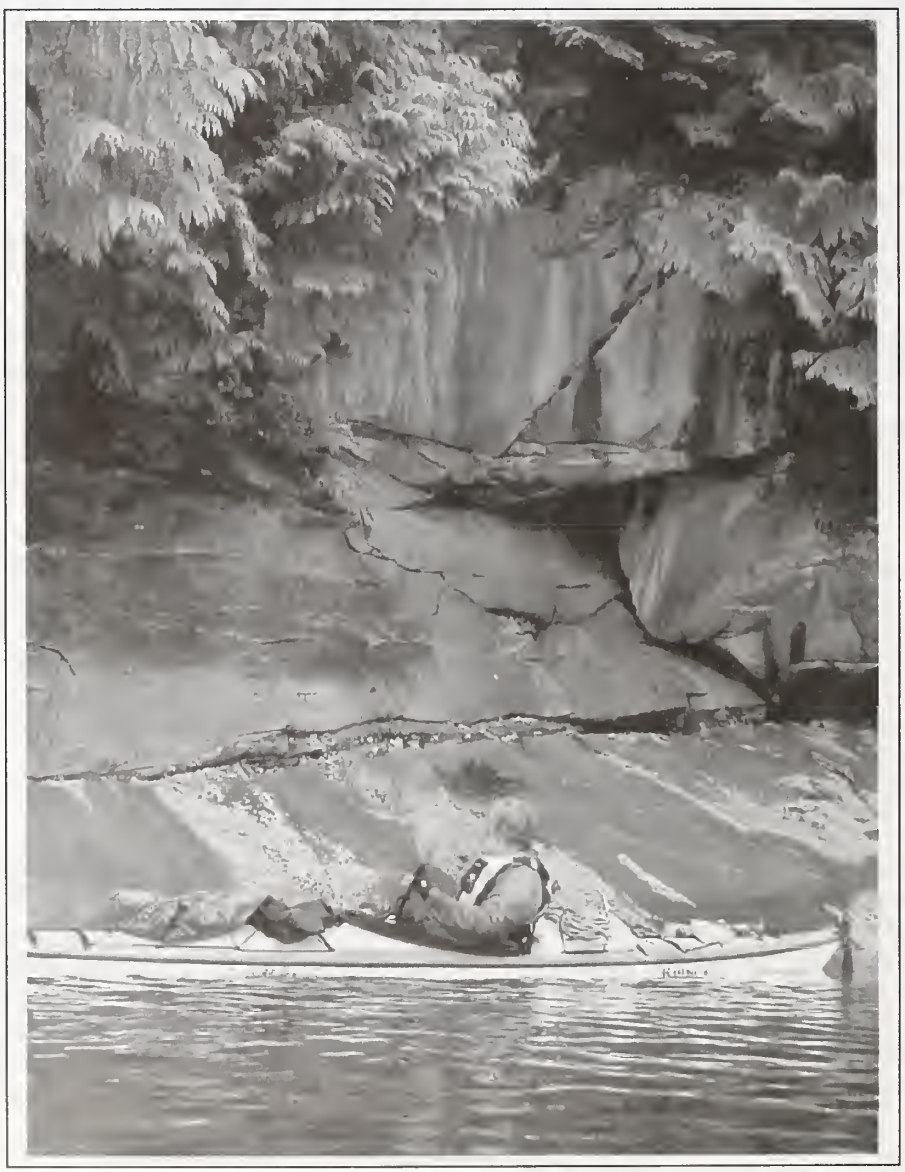
The question of accelerated erosion of intertidal fish traps and weirs in harvested watersheds remains unresolved. Wooden stake traps are eroding from the cut banks of streams in many estuaries. Whether erosion is more rapid in those drainages subjected to more intense timber harvest activities remains to be determined. Most of the monitored fish trap sites have weir stakes missing and/ or had eroded stakes laying on the surface, indicating recent erosion events. We need to determine if we are in the middle or near the end of some kind of erosion cycle and whether this phenomenon is continuing. Likely other stake weir sites on the forest are being lost due to similar circumstance and we need to develop a management and data recovery plan before these ancient features are completely lost. We need to monitor some fish trap and weir sites annually to determine the rate and nature of the erosion.

The Tongass heritage program team has adopted the philosophy that site protection is best served through education and public outreach, fostering a fuller appreciation of the values embodied in the archeological record and thus recruiting the public as active stewards of heritage resources. Delineating this philosophy, the Forest's archeologists are increasingly working with school students, contributing to the development of college curricula (through the University of Alaska Southeast and other institutions), and sharing new discoveries at community presentations. Through programs such as Alaska Archeology Month and Passport in Time, archeologists have connected with thousands of forest visitors who now have a better appreciation of the value of heritage resources and our approach to their management.

These significant successes create a growing demand. With information comes interest; with interest comes a desire to be involved and a demand for more information. We have planted the seeds of stewardship, and promised to share information through the classroom and through volunteer programs. To keep the support of the teachers, students, and volunteers we have enlisted, we must keep our promises to make the program work. We need to be able to go to the classrooms, when called upon. We need to continue to offer avenues through which local and non-local volunteers can participate in heritage resource management. We must reach new generations of students with the values of learning from and about the past.

To effectively raise the public consciousness on the subject of historic preservation and conservation, it is essential the Forest Service work with Indian Tribes and corporations and the State of Alaska. Publicized partnerships in site management with Sealaska Inc. and Sealaska Heritage Institute would be particularly productive in sending a message of shared value to the residents and visitors of southeast Alaska. All signs point toward a closer relationship between Native Americans and archeologists in the management of heritage resources and the conduct of archeological research. New regulations implementing the National Historic Preservation Act require much closer and sustained tribal consultation at all levels of project planning. The ongoing process of repatriation and consultation under the Native American Graves Protection and Repatriation Act bring federal agencies and Indian Tribes together. At the same time, in Southeast Alaska, Sealaska Corporation is attempting to actively manage programs for its 85 historic and cemetery sites acquired through the historic and cemetery sites provisions of the Alaska Native Claims Settlement Act (Section 14(h)(1)). Sealaska seeks to work with clans and tribes to develop plans to manage these sites and to influence the management of historic and archeological sites on other lands (federal, state, private). The overlap in mission between the Tongass National Forest and Sealaska Corporation presents partnership opportunities.

A significant step forward in management of heritage resources in Southeast Alaska would be to develop agreements for cooperative management of historic and archeological sites in the region. Working together, clans, tribes, corporations, and federal and state agencies could more effectively learn from and protect these important cultural places.



Karst and Caves

Goal: Maintain and protect significant karst and cave ecosystems Forest-wide.

Objectives: Allow for the continuation of natural karst processes and maintain the productivity of the karst landscape while providing for other land uses where appropriate.

Background: The Tongass National Forest contains the largest concentration of dissolution caves known in the State of Alaska. The Forest also contains world-class surface, or epikarst features in the alpine and sub-alpine zones. The caves and epikarst features result from chemical weathering of limestone and marble bedrock. A relatively recent discovery in the lands within southeastern Alaska, karst and cave features and associated resources are of national and international significance. Southeastern Alaska karst systems are recognized for the complexity and diversity of their development, their biological, mineralogical, cultural, and paleontological components, and recreational values.

The Federal Cave Resources Protection Act (FCRPA) is the primary U.S. law affecting caves. It requires protection of significant caves on Federal lands. A cave must possess one or more of the criteria outlined in 36 CFR Part 290.3 to be determined "significant." Though "non-significant" caves may exist, most southeastern Alaska caves meet the criteria for "significant." The intent of this act is to protect cave resources, not karst resources. Caves and their associated features are an integral part of the karst landscape; and therefore, karst must be managed as an ecological unit to ensure protection of the cave resources.

Revisions to the Tongass Land Management Plan (TLMP) between 1993 and 1997 included guidance in five "emphasis areas," including karst and cave resource management. Standards and guidelines were developed which provided for other land uses while taking into account the function and biological significance of the karst and cave resources within the landscape. A karst and cave resource significance assessment completed by Aley et al in 1993 assessed the most current thinking on karst management issues. The Tongass National Forest adopted a "risk assessment" management strategy known as "vulnerability mapping." "Karst vulnerability assesses the susceptibility of the karst resources to any land use. Some parts of a karst landscape are more sensitive than others to planned land uses depending on the “open” nature of the karst system; its ability to transport water, nutrients, soil and debris; and the presence of pollutants in to the underlying hydrologic systems. The strategy assesses the capability for post-harvest regeneration in karst landscapes, the maintenance of water quality issuing from the karst hydrologic systems, and the protection of resource values within the underlying cave systems as outlined in the FCRPA.

The Forest Plan Standards and Guidelines for Karst Resources also outlines a four-step process for karst inventory and assessment: a) identification, b) inventory of the karst development; c) inventory of the karst hydrologic systems, and d) evaluation karst resources as to their vulnerability to land uses affecting the karst systems. The Forest Plan Standards and Guidelines for Karst Resources are found in Chapter 4, pages 4-18 to 4-19 and in Appendix I, specifically pages I-12 to I-16. Implementation of these standards has brought to light discrepancies that require clarification. Specifically, Section III, A. (4) of the Karst Landscape Assessment, entitled “Assess Vulnerability of the Karst Terrain to Management Activity”, provided the greatest challenge for implementation. For example, low, moderate, and high vulnerability karst lands require definitions and examples. The application of appropriate mitigations has been inconsistent. And, the karst and caves conflicts with riparian management standards have surfaced as topics that require clarification.

Ongoing projects, and those with signed Records of Decision (RODs) focus on karst area protection. The Forest Plan standards and guidelines require that areas of high vulnerability karst within the project area be removed from harvest applications. Low to moderately low vulnerability karst may be located within timber harvest units. These Standards and Guidelines are fully implemented in upcoming projects. Karst resource input was also provided to the various Federal Highway Road Projects on Prince of Wales Island and to the Tongass Wilderness Evaluation SEIS.

Karst and Cave Question 1: Are Karst and Cave standards and guidelines being implemented?

Monitoring was completed on projects implemented under the direction of the standards and guidelines in the Forest Plan. Work completed under the Forest Plan Karst and Cave standards and guidelines included preliminary inventory, cave inventory and mapping, timber unit and road reconnaissance, timber unit layout, and road layout. The standards and guidelines were implemented to the fullest extent practicable.

Monitoring Results

The Karst and Cave standards and guidelines outlined in the Forest Plan were implemented. The following are projects where the current Forest Plan Karst and Cave Standards and Guidelines were applied:

Cholmondeley, Moria, Otter Lake, Staney, Licking Creek, Logjam, Cobble, Gravina Island, Suemez Island, Couverden, Rockfish, Tuxekan Island and Kosciusko Island Timber Sales

Efforts are being made to insure that the karst and cave standards and guidelines are fully implemented in the planning of all applicable projects. These efforts including incorporating resource specialists' actions in the planning process, discussing and reviewing findings with contractors, designing and analyzing dye trace programs, conducting on-the-ground inventory, resource report writing, reviewing of resource sections of the DEIS or FEIS for the projects, and answering public comments.

The DEIS for the Kosciusko Island Project had been published and public comments received. The original timber unit pool was greatly modified as a result of the karst resource inventories, and high vulnerability areas were placed in reserves. The DEIS for the Tuxekan Island Project is nearing completion and undergoing internal review; and, the Final EIS is nearing completion for the Licking Creek Project.

Evaluation of Results

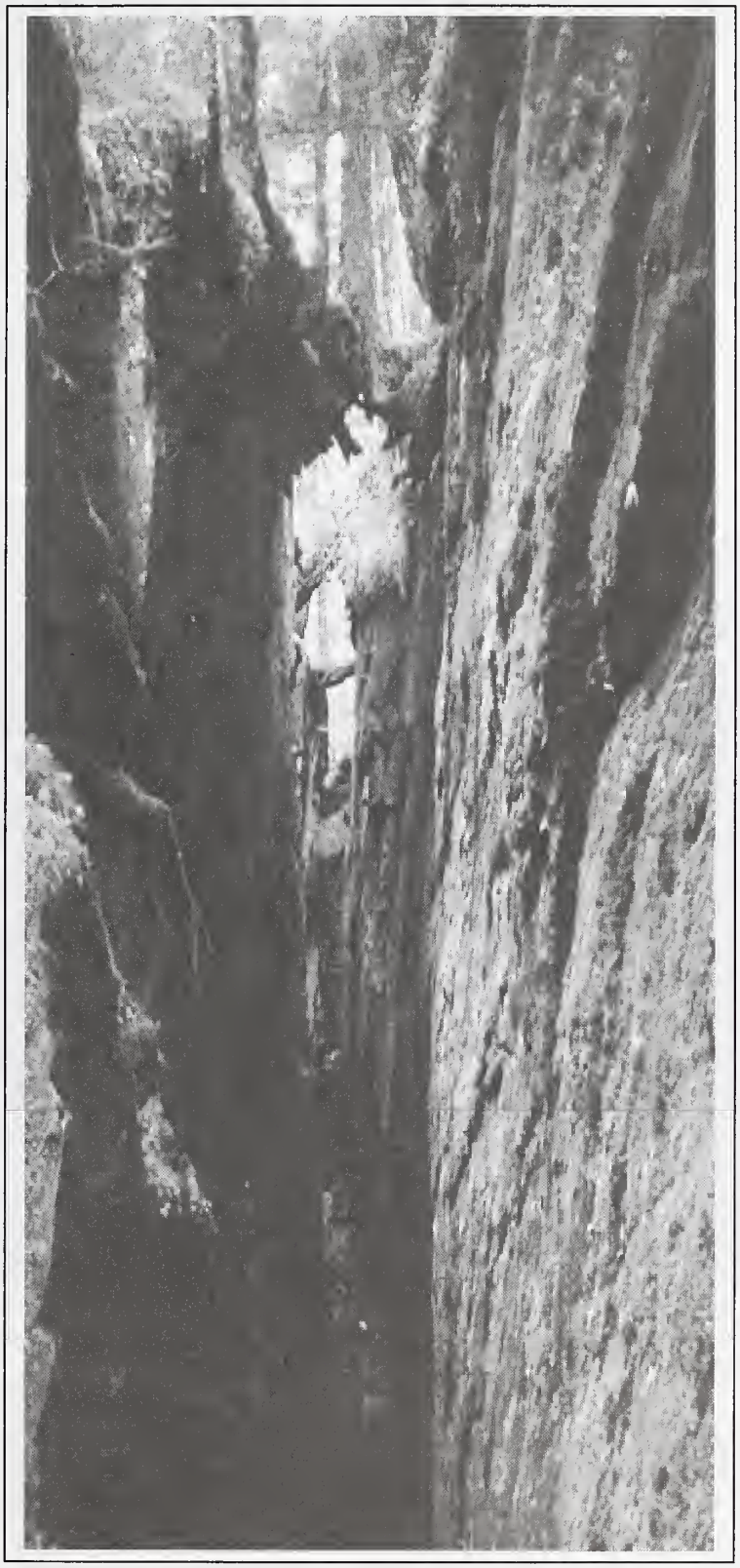
DEIS and FEIS: Karst has been identified in the proposed harvest areas of the Cholmondeley, Moria, Logjam, Staney, Tuxekan, Kosciusko, Otter Lake, Suemez (Scratchings), Gravina, and Licking Creek Timber Sale projects. These areas were inventoried or are in the process of being inventoried, and the proposed timber unit pool modified to protect the karst and cave resources, particularly the function and integrity of the karst systems, rather than individual features. LIDAR generated digital elevation modules (DEMs) planned for some of these projects will aid in these inventory efforts. However, timely delivery of these high resolution DEMs given the unpredictable weather has resulted in the data collection lagging behind current analysis schedules. The North Prince of Wales Island Road EIS will require a karst vulnerability assessment and tracer dye trace to determine the impacts of the proposed road relocation and design. The Regional Office, engineering branch, is currently designing specifications to complete this work as part of the design contract.

The Tuxekan and Kosciusko Island projects are moving towards completion of the DEIS and FEIS, respectively. Resource reports, watershed assessments, and karst vulnerability reports have been completed and reviewed. Public comment on the Kosciusko Project has been received. On the Licking Creek Project, the geology of the project area and the surrounding areas adjacent to the Shoal Cove Road system were mapped. This data combined with aerial photograph interpretation have been digitized into the GIS database. Field reconnaissance and inventory were conducted on the proposed Licking Creek timber unit pool and a resource report was completed identifying the vulnerability of the karst resources found there. A large cave system was found within one of the marble outcrop units was not inventoried in the summer of 2002 due to weather and exploration is planned for the 2003 field season. Units and roads have been designed to avoid these areas.

The Ketchicave Expedition on Kosciusko Island was held during the summer of 2002. Volunteers from around the world worked for 4 weeks on mapping and inventorying over 25 caves on this

island. The final report of this exploration is nearing completion. The discoveries of this group of volunteers will be incorporated into the design of the alternatives in the Kosciusko Island EIS.

Communication remains good between the Tongass National Forest and the Glacier Grotto special interest group. Results of the Tongass Cave Project field inventories on Kosciusko Island have been shared and incorporated into the overall island inventory.



Karst and Caves Question 2: Are karst and cave standards and guidelines effective in protecting the integrity of significant caves and the karst resource?

In 2002, a review of karst standards and guidelines included the proposed changes to those standards as the result of past implementation and monitoring. Also, the summary from the karst research summit held in 2002 resulted in more proposed changes to the Standards and Guidelines. In the spring of 2002, the Forest wrote a Natural Resources Task Order Contract with a group of karst specialists. The contract requested they summarize the effectiveness of the implementation of the current Karst Management Standards and Guidelines and to analyze the appropriateness of the proposed changes to those Standards. The report summarizing the findings of this Review Panel is nearing completion. The panel was comprised of: Thomas Aley, Ozark Underground Laboratory, Protem, Missouri; Paul A. Griffiths, KarstCare, Campbell River, British Columbia, Canada (principal author); William K. Jones, Karst Waters Institute, Charles Town, West Virginia; and, Dr. Stephen R. H. Worthington, Worthington Groundwater, Dundas, Ontario, Canada. The Panel visited representative karst sites on Prince of Wales, Heceta, and Kosciusko Islands, from June 11-19, 2002.

The following key issues were identified and discussed: karst assessments, use of no-harvest buffers, windthrow salvage, second growth management, catchment area management, training, data management, staffing, promoting the karst program, and karst studies and monitoring. Where proposed changes to the current standards were found to be deficient, the Panel recommended corrective action. The Panel noted, for example, that current training levels may be inadequate for sustainable karst management and recommended that more training be provided as short courses. The Panel also outlined the action required to more actively manage karst landscapes covered with second growth timber stands. The Panel's recommendations will be incorporated into proposed changes of the current standards under the upcoming review of the Forest Plan.

Monitoring Results

Karst Management Standards and Implementation Review: The Panel found that implementation of the 1997 Forest Plan Karst Standards and Guidelines has ensured a high level of protection for karst resources overall. The Panel noted high standards in both the philosophy of management, and the way that specific management practices were formulated and applied. Implementation of specific policies and procedures was found to be very good and in general compliance with the stated goals and objectives of the karst program. The Panel also noted the extent to which high vulnerability karst had been protected since 1997.

GIS modeling for the Tongass Wilderness Evaluation SEIS allowed for an analysis of all the karst lands on the Tongass National Forest. Extensive areas of very pure carbonate, totaling 555,770 acres (869 square miles), were found within the boundaries of the Tongass National Forest. About 467,600 acres (731 square miles) of carbonate underlie the lands currently administered by the Tongass National Forest. Of those acres, 88,763 acres are in the Wilderness Group Land Use Designations (LUDs) and 158,926 acres are in Natural Setting LUDs. These total to 247,689 acres or 53% of the karst lands. The remaining 219,991 acres of carbonate are in Development LUDs. Of these acres, 41,333 have been mapped as high vulnerability karst lands. Of the remaining 178,579 acres of karst lands within the development LUDs, 108,770 acres are mapped as suitable lands for timber production.

It is estimated that through inventory and karst vulnerability assessments, that a minimum of 30% or 32,631 acres of additional high vulnerability karst lands would be characterized from those suitable lands. Considering all these LUDs, the suitable land base, and projected inventory results, 391,462 acres or 84% of the karst lands are protected or are modeled to be protected. Therefore, the remaining 16% of the karst lands may be available for some level of management pending the results of a thorough inventory and karst vulnerability assessment.

Monitoring of the effectiveness of the implementation of the current Standards and Guidelines over the past few years has shown the need for clarification and changes to the standards. Standards changes we applied in the Kosciusko and Tuxekan Island Projects, the Licking Creek, Gravina, and Heceta Commercial Thinning projects. Karst was either a minor issue or a non-issue

in Cholmondeley, Moria, Otter Lake, Cobble, Gravina Island, Suemez Island (Scratchings), and Rockfish Project Areas.

Evaluation of Results

The karst and cave management standards and guidelines, where applied, were shown to be effective in protecting the integrity of significant caves and karst resources. Implementation of these guidelines across the Tongass has been inconsistent and problematic. This may be due in part to unclear direction and limited field experience of personnel with this often less than visible resource.

Monitoring of karst and cave systems adjacent to timber harvest units and roads indicate that past harvest activities and road construction implemented prior to the new standards and guidelines may have contributed to changes in the karst hydrology of the systems, and introduced sediment and debris into some cave systems. Monitoring of the effectiveness of the implementation of the standards and guidelines over the past few years has shown the need for improvement of implementation procedures and identified needed changes to the Standards. These changes are being implemented in upcoming projects. Incorporating the recommendations of the Karst Review Panel into the Forest Plan is one of the items being addressed during the midterm review of the Forest Plan is forthcoming.

Land Management Planning

Background: The Forest Service policy and direction for improvement of government-to-government relationships, and collaborative, community-based resource stewardship establishes a goal of compatibility of Forest Service management activities with the goals and objectives of adjacent lands. In addition, 36 CFR [219.7(f)] requires that a program of monitoring and evaluation shall be conducted that includes the effects of National Forest management on lands, resources, and communities adjacent to or near the National Forest project or activity being planned. Effects upon National Forest land from activities on nearby lands managed by other Federal, or state government agencies, or under the jurisdiction of local governments will also be monitored and evaluated.

Land Management Planning Question 1: Is the management of National Forest System lands consistent with management objectives of adjacent lands and their management plans?

Monitoring Results

National Forest management projects with decisions completed in FY 2002 have been evaluated to determine if any non-National System lands are adjacent to the project locations. Projects that have been appealed and decisions remanded during the 2002 fiscal year were not evaluated.

The projects identified as having adjacent non-National Forest System lands are listed below, along with details on the type of project, management objective, and consistency determination between the management objectives on the National Forest land and adjacent lands. Lands identified as being adjacent are within a distance that could possibly be influenced by the project.

Juneau Ranger District

Eagle Beach Land Exchange

The State of Alaska will be selecting the Forest Service's 40-acre Eagle Beach Recreation Area. This piece of Forest Service property is an inholding within the State of Alaska's Eagle Beach State Park. The proposed exchange is within a designated recreation area.

Non-National Forest System Lands: This project is adjacent to state land. This project is fully compliant with the management of non-National Forest System lands and will enhance the surrounding state recreation area.

Forest Service Administrative Compound in the Mendenhall Valley

The Juneau Ranger District and Admiralty Island National Monument will construct an administrative complex on land along the Back Loop Road. In 1997 the Forest Service acquired this parcel of land from another federal agency at that time the parcel was classified as an Administrative Site. The complex will consist of: offices for both the Ranger Districts, a heated warehouse, dry storage, bunkhouse facilities and associated parking.

Non-National Forest System Lands: This project is adjacent to private land. This project is fully compliant with the management of non-National Forest System lands.

Ketchikan-Misty Ranger District

Harriet Hunt Firewood Cutting Area

The Harriet Hunt firewood sale is along the Ketchikan road system, about nine miles north of Ketchikan. It consists of one harvest unit, approximately 4 acres, of down and near dead wood that has been changed to a designated public firewood cutting area. This project area is located in a Timber Production LUD.

Non-National Forest System Lands: This project is adjacent to private land. This project is fully compliant with the management of non-National Forest System lands.

Petersburg Ranger District

Road Use Permit For Use of Forest Roads At Thomas Bay

Cascade Sand and Gravel has been authorized to haul mineral material from a State of Alaska borrow pit near Thomas Bay on the Petersburg Ranger District over Forest Road 5256. The haul route is adjacent to State of Alaska land. The road use permit that authorizes this use includes stipulations to help avoid impacts to resources, the public, and adjacent non-National Forest System lands.

Non-National Forest System Lands: This project is adjacent to non-National Forest System lands. This project is fully compliant with the management of non-National Forest System lands.

Sitka Ranger District

Summit Windjammer Timber Sale

The Summit Windjammer Timber Sale is along the False Island road system, and about 68 miles north of Sitka. It consists of one harvest unit, approximately 2 acres, of down and wind thrown timber that was sold commercially. This project area is located in a Timber Production LUD.

Non-National Forest System Lands: This project is adjacent to private land. This project is fully compliant with the management of non-National Forest System lands.

Thorne Bay Ranger District

North Prince of Wales/ El Capitan Road Improvements Project

This project provides roadside enhancements in the north-central portion of Prince of Wales Island. More than 24 miles of road upgrades are included in the project. During 2002, approximately 6.5 miles of road between the National Forest System Road (NFSR) 20 /NFSR 25 junction to the Whale Pass boat harbor on Prince of Wales Island was resurfaced. This project includes land areas in six LUDs. Ninety-five percent of the roadways are located in: Timber Production (24.4 miles); Old-growth Habitat (6.7 miles); and Wild, Scenic, or Recreational River (2.6 miles) LUDs.

Non-National Forest System Lands: This project includes non-National Forest System Lands in the vicinities of Naukati and Whale Pass. This project is fully consistent with the management of adjacent non-National Forest System lands.

Lab Bay Road Reconstruction

Approximately 42.2 MMBF from 49 harvest units is scheduled for harvest on the rights of way in this ongoing project (171,862 acres). In conjunction with this sale, a total of 34 miles of road construction/reconstruction are planned. Road construction associated with the Ridge Timber Sale was completed in 2002. This project area is located on the northern end of Prince of Wales Island. This construction will contribute to the economic stability of local communities. Eighty-nine percent of the project area is designated LUD III or IV; 10,351 acres of non-National Forest System lands are adjacent to this project area.

Non-National Forest System Lands: Portions of this road are next to state, municipal and corporation lands. The project is fully consistent with the management of adjacent non-National Forest System lands.

Wrangell Ranger District

Special Use Authorization for Waterline and Water Impoundment

A Special Use Permit has been issued for a waterline and water impoundment on Tongass National Forest lands on the mainland, near Green Point by the Stikine River. These features are located in an area identified in the Forest Plan as having a Land Use Designation of Old-growth Habitat (OG)

Non-National Forest System Lands: The permit was granted to the individual who owns private land adjacent to the permitted National Forest site. This project is fully consistent with the management of adjacent non-National Forest System lands.

Temporary Hunting Shelter Special Use Permit

A Special Use Permit was issued on Sergif Island, in the delta of the Stikine River, for a temporary hunting tent platform. This permitted platform is adjacent to private land; the landowner objected to the issuance of the permit but could not appeal the decision and the permit was issued. The platform is located in an area identified in the Forest Plan as having a Land Use Designation of Wilderness (WW).

Non-National Forest System Lands: This project is fully consistent with the management of adjacent non-National Forest System lands.

Petersburg, Juneau, Sitka, Ketchikan – Misty Fiords Ranger Districts

Alaska Army National Guard Training Areas Special Use Permit

The Alaska Army National Guard has been authorized to conduct training activities consisting of not more than 35 individuals for foot patrol, snowmobile, watercraft, 4-wheeler, SUSV (tracked vehicle designed to operate on or off highway), and helicopter insertion and extraction. Authorized activities include site security, non-intrusive listening/observation post operations, mapping and orienteering, communications, and unit training activities. A special use permit authorizes these activities on specific areas of the Petersburg, Juneau, Sitka, and Ketchikan–Misty Fiords Ranger Districts. The special use permit includes stipulations to help avoid impacts to resources, the public, and adjacent non-National Forest System lands.

Non-National Forest System Lands: This project is adjacent to non-National Forest System lands. This project is fully compliant with the management of non-National Forest System lands

Evaluation of Results

No projects completed were found to be inconsistent with the plans of the agencies regulating the non-National Forest land during 2002. This has been the trend for the past several years.

Management of National Forest System lands is consistent with management objectives of adjacent lands and their management plans in FY 2002. Efforts of the Forest Service to improve government-to-government relationships as well as collaborative, community-based resource stewardship contributed to achieve compatibility of Forest Service management activities with the goals and objectives of adjacent lands. The trend of consistency has been documented over the past several years.

National Forest Management projects with decisions completed in FY 2002 were evaluated to determine if any non-National Forest System lands existed adjacent to project locations. Projects that have been appealed, and decisions remanded during FY 2002 were not evaluated. The projects identified as having adjacent non-National Forest system lands (adjacent is defined as within a distance that could possibly be influenced by Forest management) include the following projects listed by ranger district:

- Juneau Ranger District: Eagle Beach Land Exchange, and Forest Service Administrative Compound in the Mendenhall Valley,
- Ketchikan-Misty Ranger District: Harriet Hunt Firewood Cutting Area,
- Petersburg Ranger District: Road Use Permit For Use of Forest Roads At Thomas Bay,
- Sitka Ranger District: Summit Windjammer Timber Sale,
- Thorne Bay Ranger District: North Prince of Wales / El Capitan Road Improvements Project and Lab Bay Road Reconstruction,
- Wrangell Ranger District: Special Use Authorization for Waterline and Water Impoundment, and Temporary Hunting Shelter Special Use Permit, and
- Multiple District project: Alaska Army National Guard Training Areas Special Use Permit.

Local and Regional Economics

Goal: Provide a diversity of opportunities for resource uses that contributes to the local and regional economies of Southeast Alaska.

Objective: Work with local communities to identify rural community assistance opportunities and provide technical assistance in their implementation. Support a wide range of natural resource employment opportunities within Southeast Alaska's communities where economically viable.

Background: The Tongass National Forest comprises approximately 80 percent of Southeast Alaska's total land base. The 33 communities within Southeast Alaska use and depend on Forest resources for economic opportunities, quality of life, traditions and cultures, and recreation activities. Forest management decisions can have significant impacts, positive and negative, on these communities.

Question 1: Are the effects on employment and income similar to those estimated in the Forest Plan?

Data Collection: Annually summarize estimates of the natural resource employment and income estimates from the Alaska Department of Labor employment and earnings data. Compare these annual estimates with those estimated in the Forest Plan. Readers are referred to the SEIS (USDA Forest Service 2003) for the most updated statistics and references on local and regional economics.

Evaluation Criteria: Effects of Forest Plan implementation on employment and income by resource sector.

Precision and Reliability: Employment and income statistics for resource industries are difficult to collect for several reasons. Alaska Department of Labor employment and earnings statistics do not include self-employed persons. Most commercial fishers, many loggers, and tourism-related operations are not reflected in State data. The U.S. Bureau of Economic Analysis income and employment data does include self-employed persons, but it is not reported in the detail necessary to break out each resource-industry. In addition, State disclosure laws relating to income prevent the Alaska Department of Labor from releasing detailed figures, resulting in several gaps in the analysis.

Employment and earnings data is collected and reported by industry sectors. Every business operation has an assigned industry code for which data is reported to the State. In the case of the Recreation and Tourism sector, no single industry code exists, but it is made up of many different services and retail trade operations. The amount of business activity directly related to recreation and tourism activity is not easily available from the reported data. Recreation and Tourism figures for Forest Plan analysis were estimated using non-agriculture wage and salary employment data (not inclusive of self-employed), IMPLAN modeling output, and survey data. The data presented for this monitoring report are not directly comparable to the estimates in the Forest Plan, but are included for general trend analysis of the industry.

A similar situation exists with commercial fishers. Because most of them are self-employed, their earnings are not reflected in State data reports. The Forest Plan assumed any significant impacts to salmon fisheries would not be related to Forest management activities (see the 1997 Forest Plan FEIS, page 3-491). The employment and earnings data for seafood processing has been presented as an analysis of general trends in the commercial fisheries industry rather than a direct comparison of Forest Plan estimates.

Monitoring Results

Monitoring results are shown in Tables 2-25 and 2-26 including Forest Plan estimates and the Alaska Department of Labor employment and earnings data.

Table 2-25. Forest Plan Estimated Employment and Earnings for Southeast Alaska, Annual Equivalent [1]

Employment Sector	ASQ		NIC 1	
	Jobs	Earnings ($ millions)	Jobs	Earnings ($ millions)
Wood Products	1,724	77	1,379	32
Recreation/Tourism	3,698	117	3,698	117
Salmon Harvesting [2]	--	--	--	--
Mining	810	49	810	49
Southeast Alaska Total	**41,416** [3]	**1,324** [3]	**5,887**	**198**

1. Forest Plan estimates are from the 1997 FEIS, Table 3-140. NIC I estimates for wood products are 80% of the ASQ total.
2. The Forest Plan did not measure impacts to Salmon Harvesting or Seafood Processing because much of the changes in the industry are not influenced by Forest Service activity; see 1997 Forest Plan FEIS pages 3-491 for details.
3. Employment and earnings in all sectors.

Table 2-26. Reported Southeast Alaska Employment and Earnings, Annual Equivalent (Non-agriculture Wage and Salary [NAWS] Employment and Earnings[1]), Years 1995 through 2000[7]

Employment Sector	Jobs/ Earnings ($ millions) 1995	1996	1997	1998	1999 [4]	2000 [5]
Wood Products	2,069 $95	1,740 $79	1,456 $75	1,221 $57	1,156 $50	1,074 Incomplete
Retail and Services[2]	12,594 $242	12,702 $252	12,830 $254	13,006 $263	13,453 $276	13,623 $288
Seafood Processing[3]	1,587 $40	1,326 $36	1,444 $34	1,289 $33	1,491 $42	1,487 Incomplete
Mining	189 $12	273 $18	331 $22	337 $23	318 Not shown	309 Not shown
SE Alaska[6] Total	35,452 $1,083	35,643 $1,077	35,571 $1,080	34,954 $1,071	35,451 $1,081	35,895 $1,119

1. NAWS data includes all full- and part-time wage and salary employment; this does not include any self-employed persons.
2. Retail and Services includes all employment and earnings in these sectors, not just those associated with Recreation and Tourism. This category is used to present general trends of the sectors rather than direct comparisons.
3. Seafood processing is presented to highlight general trends of the commercial fishing industry rather than direct comparisons with the Forest Plan. Salmon harvesting data is not available because the majority of commercial fishers are self-employed and their earnings are not counted by the Alaska Department of Labor.
4. In 1999 and 2000, financial figures are not broken down for individual job categories.
5. 2000 figures are the latest on the state web site as of 01/03.
6. Total all SE Alaska Employment and earnings.
7. No figures listed by the state later than 2000 (as of 01/03).

Analysis: Describe and explain the difference between the Forest Plan estimates and actual employment and earnings data.

Wood Products: The Forest Plan employment and earnings figures include activities associated with private, state, BIA, Forest Service, and Native Corporation timber harvesting. The figures associated with the Forest Plan in Table 2-27 have been adjusted for the 1997 Forest Plan FEIS. Employment in the wood products sector currently is lower than predictions in the 1997 FEIS.

Recreation and Tourism: The recreation and tourism estimate in the Forest Plan, as explained above, was not recalculated for this analysis; instead, employment and earning figures for the Retail and Service sectors are used as a proxy of general trends. The Forest Plan estimate

includes an estimate of self-employment and assumes full implementation, with all opportunities for recreation and tourism being fully developed. The employment and earnings data from the State do indicate an increasing trend in those sectors associated with tourism and recreation activities. Information more directly related to trends in the tourism industry is displayed under the Recreation and Tourism monitoring section of this report.

Commercial Fishing: State data do not include self-employed commercial fishing activities. Therefore, seafood-processing levels have been presented as a proxy for the general trends in the Fisheries industry. Current trends in seafood processing (as well as salmon harvesting) are more likely a reflection of global market conditions than Forest management activities.

Mining: The large difference in employment and earnings between the Forest Plan's anticipated levels and 2002 reported levels could be explained in terms of implementation. For the purposes of analysis, the estimates presented in the Forest Plan assume full implementation of all potential mining sites during the life of the plan, and they should thus be seen as a potential maximum under ideal market conditions, given known mineral deposits. In reality, only profitable mining sites are likely to be opened. If gold prices do not increase significantly, it is unlikely that the mining industry will ever reach employment levels estimated in the Forest Plan unless extraction costs fall or significant new deposits are discovered.

Regional: Overall, Forest Plan estimates are higher than State data, which has exhibited little to no growth in recent years. There is a significant difference between the employment levels predicted in the plan and those reported by the State of Alaska Department of Labor. Forest Plan figures, however, include an estimate of self-employed persons, and they are not directly comparable to the Alaska State data, which does not include such an estimate.

Wages: Wage estimates used in the Forest Plan were based on past wages and input/output modeling. Forest Plan wage estimates and actual wages reported by the Alaska Department of Labor (Table 2-27) are in nominal dollars.

Table 2-27. Southeast Alaska Annual Average Wages, Nominal Dollars

Forest Plan			1996	1997	1998	1999[5]
Wood Products	$44,542	Wood Products	$45,228	$51,751 [2]	$47,043 [3]	$43,725
Recreation/Tourism	31,773	Retail [3]	18,345	18,045	18,459	$18,425
		Services [3]	21,277	21,325	21,568	$22,136
Salmon Harvesting [4]	26,418					
Seafood Processing	26,074	Seafood Processing	26,987	23,724	25,288	$28,364
Mining	60,971	Mining	67,128	65,729	69,214	Incomplete[7]
Southeast Alaska[6]	30,914	Southeast Alaska	30,223	30,359	30,630	$30,499

1. NAWS = Non-Agriculture Wage and Salary Earnings. This data includes all full- and part-time wage and salary employment; this does not include any self-employed persons.
2. Earnings for this year appear to include a large amount of severance pay associated with mill closures.
3. The Retail and Service sectors include more than recreation and tourism related activity. These sectors are provided to highlight general trends rather than direct comparisons.
4. Salmon Harvesting is not included in the Alaska Department of Labor data because the majority of commercial fishers are self-employed and their earnings are not counted in NAWS data.
5. 2000 figures are not broken down into specific categories for wages. Year 2001 and 2002 figures are not out as of 01/03.
6. All NAWS jobs in SE Alaska
7. State records show 318 people in mining but no earnings are shown.

Recreation and Tourism estimates are significantly higher than wages reported by the State for the Retail and Services sectors. This difference is related to the assumption of full implementation of the Forest Plan, in which case all recreation and tourism opportunities would be used to provide employment and income in the future. The general increases in wages of the Retail and Services sector support the higher estimate, but it is unlikely that average Retail and Service wages will increase to the estimated level over the life of the plan.

Seafood Processing estimated wages are higher than 1998 but lower than 1999 state report wages. This is likely reflective of a highly variable industry that is more influenced by global markets and ocean conditions than Forest management activities.

Overall, the estimated average annual wage is somewhat higher than the wages reported by the State, but the regional trend indicates a decline in 1996, with some recovery in 1997 and 1998. This could be due to a combination of poor commercial fish markets, decline in the wood products industry (which is associated with high pay jobs), and an increase in the Retail and Service sectors (which are associated with lower paying jobs).

Evaluation of Results

Stagnant employment growth in the region is a cause for concern. Timber employment is declining and is becoming significantly lower that predicted. Declines in fishing and related employment are the result of external forces beyond the control of the Forest Service. Readers are referred to the SEIS (USDA Forest Service 2003) for the most comprehensive treatment on this subject to date.

Local and Regional Economics Question 2: Has the Forest Service worked with the local communities to identify and pursue Rural Community Assistance opportunities?

Background: The Rural Community Assistance (RCA) Program is a Forest Service program consisting of two parts: the Economic Recovery Program (ERP) and the Rural Development (RD) program.

Economic Recovery Program: The Forest Service notifies rural communities in or near the national forests of the program and responds to requests for assistance from communities. The program has grants that are available to (a) organize community action teams, (b) develop community action plans, and (c) implement projects from the community action plan. Grants are competitive and contingent on annual appropriations. Because of the historically high number and size of forest fires occurring in 2002, the Economic Recovery Grant Program was delayed due to reprioritization of funding to support agency forest fire suppression costs.

Rural Development Program: The Forest Service has entered into a cooperative agreement with the State of Alaska to provide this funding through the State's Community Development Block Grant (CDBG) mini-grant program. The program provides seed money for community projects statewide that will produce long-term jobs.

Effects of the RCA program: The 2002 community level effects of the RCA program are noted in Table 2-28. The Forest staff readily works with communities who desire assistance. Some ranger districts have increased collaborative stewardship efforts that often lead to identification and pursuit of RCA opportunities. The Forest has two full-time positions to implement the RCA program. Monitoring levels are fully adequate.

Table 2-28. 2002 Rural Community Assistance Activities and Effects*

Community Name	Ranger District	RCA Activity (Yes / No)	Comment (Effect)
1. City of Wrangell	WRD	Y	Provided GIS wetlands analysis for Wrangell Institute property and Community Golf Course.
2. City of Wrangell	WRD	Y	Assisted city in developing a GIS database for utilities and plats.
3. City of Wrangell	WRD	Y	Provided updated area map for Chamber of Commerce information board.
4. City of Wrangell	WRD	Y	Assisted city in financial assessment of timber values on Wrangell Institute property.
5. City of Wrangell	WRD	Y	Technical assistance on City timber sale contract.
6. City of Wrangell	WRD	Y	Assisted Wrangell Cooperative Association in location of red cedar logs for use in reconstruction of the Chief Shakes Tribal House.
7. City of Wrangell	WRD	Y	Provided slope survey for baseball field renovation and fill area completion.
8. Ketchikan Gateway Borough	KRD/MFRD	Y	District Ranger serves on Community Economic Development Strategy Committee and Chamber of Commerce Resources Committee.
9. Ketchikan Gateway Borough	KRD/MFRD	Y	Forest Service cosponsored new University of Alaska Southeast forest technology program.
10. Ketchikan Gateway Borough	KRD/MFRD	Y	Completed first major trails under Trails Ketchikan partnership.
11. City of Ketchikan	KRD/MFRD	Y	Clearing for Swan-Tyee Intertie began 2002 as a result of close partnership between Forest Service and Ketchikan Public Utilities.
12. City of Saxman	KRD/MFRD	Y	Assisted City with use of ERP grant to support completion of Community Center Building.
13.Hyder Community Association	KRD/MFRD	Y	Supported completion of water bottling plant, which came online this year.
14. Yakutat	YRD	Y	Assisted Community Action Team (Chamber of Commerce) with completion of Community Action Plan.

* Petersburg, Sitka, Wrangell and Ketchikan-Misty Ranger Districts have established Resource Advisory Committees (RACs) as part of the Secure Schools and Communities Self Determination Act of 2000.

Minerals and Geology

Goals: To provide for environmentally sound mineral exploration, development, and reclamation in areas open to mineral entry and in areas with valid existing rights that are otherwise closed to mineral entry. Encourage prospecting, exploration, development, mining, and processing of locatable minerals in areas with the highest potential for mineral development. Insure that minerals are developed in an environmentally sensitive manner, and that other high-valued resources are considered when mineral developments occur. Seek withdrawal from mineral entry of specific locations where mineral development may not meet land use designation objectives.

Objective: Implement the Minerals and Geology Forest-wide Standards and Guidelines.

Background: A wide range of mineral resources and deposit types occur within the boundaries of the Tongass National Forest. Examples of some include, but are not limited to, gold, silver, molybdenum, and uranium, as well as nationally designated "strategic" and "critical" minerals such as lead, zinc, copper, tungsten, and platinum group metals. The Forest Service recognizes that minerals are fundamental to the Nation's well being and, as policy, encourages the orderly exploration and development of the mineral resources on National Forest System lands. The Secretary of Agriculture has provided regulations (36 CFR 228) to ensure surface resource protection during the exploration and development of the mineral resources.

Minerals and Geology Question 1: Are the effects of mining activities on surface resources consistent with Forest Plan expectations, as allowed in approved Plans of Operations?

Monitoring Results

Small Mining Operations

Two non-bonded, non-energy operations were reviewed and site visits done on Woewodski and Mitkof Islands on the Petersburg Ranger District. Exploration drilling had been conducted on the former claims in 2002 and the operation was found to be in compliance. The latter, a garnet claim had been inactive during 2002.

Abandoned Mines

Five abandoned mines on the Juneau Ranger District/Admiralty National Monument were visited in FY 2002, including Admiralty Alaska Mine, Empire Mine, and Friday Mine. The purpose of the site visits included mitigation of physical hazards, signing potentially dangerous mine shafts, and adits, removal of physical debris and hazardous materials, and bat surveys.

Large Mining Operations

Greens Creek Mine

Greens Creek is located on Admiralty Island. Most of the facilities lie within the Admiralty Island National Monument, however a portion of the operation is located on the Juneau Ranger District. The operation consists of an underground mine that delivers a poly-metallic (silver, zinc, gold, and lead) ore to a surface mill and concentrator, which in turn produces three separate concentrates. These concentrates are shipped to various smelters throughout the world on a regular basis.

Low metal prices have taken their toll on the Greens Creek Mine's profitability. To make up for the low prices, the mine has increased production, located more silver, and has increased mill throughput. Greens Creek's planning and permitting departments were able to accomplish the following:

- Received a State Department of Environmental Conservation Solid Waste Permit for waste rock and tails,
- Forest Service approval of four revised and amended appendices (Appendix 1-Fresh Water Monitoring Program, Appendix 3-Tailings Impoundment, Appendix 11-production Rock Piles, Appendix 14-Reclamation Plan),

- Mill improvements,
- Additional fuel storage facilities,
- Installation of a new jet turbine generator, and
- Addition of a new paste backfill plant

An EIS for expansion of the existing dry tailings disposal facility has been initiated. Public scoping has been completed. The Draft is out for comment and the final in the autumn of 2003.

This year's surface exploration consisted of reconnaissance, detailed geological mapping, ground surveying, surface geochemical sampling, and geophysical sampling. Surface drilling is proposed for the 2003 field season and an environmental analysis is currently being conducted.

Thirty-nine site visits for monitoring Best Management Practices effectiveness and compliance to their Plan of Operations were conducted during FY2002 by our Minerals Management Specialist and by the Project Manager. Our goal for site visits is once a week during the summer and every other week during the winter. Major construction activities may require daily visits.

Sampling was completed for the bio-monitoring portion of the Freshwater Monitoring Program that was approved this year. Samples were taken from four sites. Laboratory results are not expected until Spring 2003.

Kensington Gold Project

A Supplemental EIS to consider changes proposed to optimize the approved plan of operations is currently being conducted by TetraTech, a third party contractor. A Final SEIS is anticipated during the summer of 2003.

The existing (inactive) project site and facilities at Comet Beach were inspected and found to be in compliance.

Evaluation of Results

Fiscal Year 2002 inspections of mineral sites indicate that the effects of mining activities on surface resources are consistent with Forest Plan expectations. The necessity of the operator to obtain approval for their Plan of Operations provides the Forest Service the opportunity and authority to control the effects of the development on the Forest surface resources.

Recreation and Tourism

Goal: Provide a range of recreational opportunities consistent with public demand, emphasizing locally popular recreation places, and those important to the tourism industry.

Objectives: Manage the Forest's recreation settings in accordance with the Recreation Opportunity Spectrum (ROS) standards and guidelines for each land use designation (LUD).

Background: Southeast Alaska, of which the Tongass National Forest makes up about 80 percent, possesses a remarkable and unique combination of features. These include inland waterways with over 11,000 miles of shoreline, mountains, fiords, glaciers, and large or unusual populations of fish and wildlife that provide a wide range of excellent outdoor recreation experiences. Many of these opportunities cannot be duplicated elsewhere in North America, or most other places around the world. Southeast Alaska imparts a feeling of vastness, wilderness, and solitude. The small resident population enhances these feelings, and relative absence of development compared to most other national forests.

Recreation and Tourism Question 1: Are areas of the Forest being managed in accordance with the prescribed Recreation Opportunity Spectrum (ROS) Class in Forest-wide standards and guidelines?

The districts have reported that areas on the Tongass are being managed in accordance with the prescribed ROS classes as described in the Forest-wide standards and guidelines.

Many sites selected to monitor for 2002 were primarily based on the location of existing recreation facilities and areas of the districts where high use traditionally occurred. Some remote locations were visited during the course of regular patrols of the roads and waterways. Outfitter/guide special use permit records along with written and verbal accounts of guiding activity helped determine high commercial use areas. Observations were also made during the course of completing condition surveys for trails and developed recreation facilities. Additional monitoring was accomplished during the course of other project work, such as during timber sale environmental document preparation.

Not all districts were able to report the monitoring that took place on their districts for Recreation. Highlights from some of the districts are included below.

Ketchikan-Misty Fiords Ranger District

Almost 40 value comparison units (VCUs) were monitored on this District in 2002. Encounter data collected throughout the season showed visitor use in all areas to comply with their ROS classes as outlined in Forest Plan Standards and Guidelines. A few areas of concern exist where commercial tours, flight seeing and cruise ship traffic operate in close proximity to each other. One of these areas includes the main travel routes to and within Rudyerd Bay and Punchbowl Cove in Misty Fiords National Monument Wilderness. A second area of concern is Marguerite Bay in Traitors Cove along the north end of Revillagigedo Island. Recreation use by outfitters and the public was monitored at the Marguerite Bay float and the Margaret Creek bear-viewing platform to determine that ROS Standards and Guidelines were being met.

Petersburg Ranger District

Two proposed timber sales, Woodpecker and Threemile, are pending due to the roadless rule and were analyzed for ROS changes in FY 2002. These were ongoing NEPA analyses that were started in previous years and anticipated changes from Primitive or Semi-primitive to Roaded ROS settings are compatible with the Land Use Designations where they occur.

Timber harvest occurred on Mitkof Island and on the Kake and Tonka road systems on Kupreanof Island. Most areas where harvest occurred were already in Roaded Modified settings so the ROS class did not change. Several acres did change from Semi-Primitive to Roaded ROS with road relocation and construction on Kupreanof and Kuiu Islands. These ROS changes were compatible with the Land Use Designations where they occurred and were anticipated in NEPA documents.

Public use decreased at recreation facilities in FY 2002. Ohmer Creek campground issued 40% fewer camping permits, cabin use on Petersburg District was down 15% from last year, and visits to the Petersburg Visitor Center was down 22% over the summer of 2001. Use of these recreation facilities was well within the prescribed ROS classes as described in the Forest-wide Standards and Guidelines.

Wrangell Ranger District:

The Wrangell Island hosts continued to monitor use at road-accessed recreation sites on Wrangell Island between May and August 2002. Information was collected on the number of persons, location, activities, and vehicle type for 15 developed sites and trails, and for recreational driving on forest development roads.

The Anan Wildlife Observatory Interpretive Staff continued to monitor visitors during June, July, and August 2001. The information collected includes: visitor numbers, demographics, activities, length of stay, and commercial guide use.

The district recreation staff monitored use and conditions of 22 public recreation cabins and other sites throughout the Wrangell District. Information on cabin use was collected through the National Recreation Reservation System.

The Forest Service annually monitors the activities, and amount of use by outfitters and guides on the uplands throughout the district. Use is determined mostly through year-end use reports submitted by permitted outfitters and guides.

All monitoring efforts indicate that these recreation facilities are being managed in accordance with the prescribed ROS classes as described in the Forest-wide standards and guidelines.

Monitoring Results

Overall, forest wide monitoring indicates that recreation visits to day use areas, campgrounds and cabins are either stable or decreasing on the forest. The reductions in use did not occur at all sites, and some cabins received their traditional levels of high use which is attributed to either their locations near communities or their popular resource uses (fishing, hunting, wildlife viewing, etc). Monitoring information will provide indications of trends over time of visitor use for some of the Forest's most popular recreation areas.

Use at the two major visitor centers remains strong. The Southeast Alaska Discovery Center reported 55,494 visits for FY2002. They maintained and improved cooperative agreements with several small cruise ship lines and other companies to encourage better participation. During the off-season they continued with local conservation education and public programming.

Mendenhall Visitor Center reported over 300,000 visitors during FY 2002. This use is a reflection of the strong cruise ship business in Juneau and the creative programming for residents and children during the rest of the year.

The Hoonah Ranger District continued their collaborative agreements with Southeast Alaska Wilderness Exploration and Discovery (SEAWEAD) to monitor three sites for land and offshore activities.

Evaluation of Results

Districts accommodated monitoring work as a normal course of business. Information related to the ROS and the Forest-wide Standards and Guidelines will be incorporated into special use decisions that will be forthcoming in 2003. First, will be the completion of the Shoreline Outfitter/Guide Environmental Impact Statement that will refine management directions for almost 5,000 miles of shoreline along the coast of islands for four ranger districts. Next, the Petersburg and Wrangell Ranger Districts will review the allocations provided to outfitters and guides in a late 90's environmental assessment (EA) in 2002.

Recreation and Tourism Question 2: Is Off Road Vehicle (ORV) use causing, or will it cause considerable adverse effects on soil, water, vegetation, fish and wildlife, visitors or cultural and historic resources of the Forest?

The primary ORV use on the Tongass is snowmobiles and All-Terrain Vehicles (ATVs).

Snowmobiles generally make use of forest roads and higher alpine areas during the winter months, although some use does also occur on the Stikine River within the Stikine-LeConte Wilderness and in the Yakutat Forelands. Use of this equipment during winter months is restricted to times when there is adequate snow cover as provided by the Alaska National Interest Lands Conservation Act (ANILCA).

The technology of off highway travel is producing larger, more powerful vehicles with an increasing potential for resource damage. In some communities, ATVs can be rented from commercial sources, which is adding to use. ATV ownership and use is growing on almost all districts throughout the forest.

Wrangell District

ATV use primarily occurs on forest development roads. ATV use was reported at three new sites on Wrangell Island causing some damage to wetlands and fragile soils. At one of these sites, a half-mile trail was cut through scrub timber and muskeg to drag a skiff with an outboard motor to a lake. This individual received a violation notice, but it will take time for the trail to recover.

On Zarembo Island, an area with little past use has been expanded by a three-mile trail from an alpine access point. The periods of highest use on this island are still clearly within the fall hunting seasons.

Sitka District

ATV use has significantly increased on the Sitka District over the past year. ATV riders have created new trails to improve access to hunting and to increase trail mileage for recreational riding. ATV use has increased on Kruzof Island off of the existing road system. Extensive off road trails have also been found between St John Baptist Bay and C&B Lake along the edges of muskegs. Other new ATV routes have been found between False Island and Sitkoh Bay causing some resource impacts. Soil displacement and damage to vegetation has increased in the beach

fringe and grasses adjacent to the North Beach cabin. Anadromous fish streams at North Beach and Starrigavin Valley have been used for ATV routes and are causing unacceptable damage to spawning habitat.

Prince of Wales Island

Current ATV use on this island that includes the Thorne Bay and Craig Ranger Districts, shows an increase in ATV use off of Forest Development roads. There is evidence of ATV travel off these roads where they intersect with favorable terrain, such as open muskeg glades, stream courses and abandoned logging roads. The Alaska Department of Fish and Game has raised concerns about ATV travel in the stream courses located in the Maybeso Experimental Forest. There is some evidence that ATV users are reopening abandoned logging roads by cutting and removing reestablished vegetation.

Ketchikan-Misty Fiords District

Snowmobile and ATV use occurs mainly on forest roads and surrounding muskegs in the Harriet Hunt Lake and Brown Mountain area of this district. In the spring of 2002, recreation staff and law enforcement made a monitoring flight over this area to look at the impacts of this use. In addition, a field survey of ATV and motorcycle impacts in muskeg areas off the Brown Mountain Road was conducted and resource impacts were documented.

Petersburg District

On the Petersburg Ranger District, ATVs are used predominantly during moose and deer hunting season. Inappropriate ATV use occurred at several places on Mitkof Island, primarily in roadside muskegs or at recreation sites closed to this use.

Yakutat District

Yakutat Ranger District has had a gradual and continual increase in ATV use over the past 15 years. They worked with the Alaska Department of Fish and Game to evaluate impacts from ATV use on the Yakutat Forelands. This is probably the area of the forest that is receiving the most resource damage due to ATV use. Users are establishing trails primarily to reach favorable hunting and fishing areas. These “pioneer” trails generally follow the easiest routes along stream courses or across wetland meadows.

Monitoring Results

Snowmobile use on the Tongass in general is not causing considerable or adverse effects on soil, water, vegetation, fish and wildlife, visitors or cultural and historic resources. It is not generally a management concern on the forest.

Recreational use of ATVs is growing and becoming a larger issue. In isolated areas of the forest, adverse resource effects are occurring.

The monitoring efforts in Yakutat determined that improperly developed ATV trails through wetlands divert surface and ground water flow and act as drainage ditches. This reduces water residency times and alters wetland function. Long-term affects of this drainage may result in altered plant communities, degraded fish and wildlife habitat, and may result in loss of wetlands. Many areas in the Yakutat forelands with numerous trails are already exhibiting signs of watershed degradation: intercepted stream courses, stream bank and water quality degradation, and drainage of wetlands.

Most of the other districts had minor adverse resource impacts that could be grouped into two areas.

- Rutting and vegetation loss in muskeg areas. Repeated passes by ATV users impact the wet, organic soils of these areas.
- Degradation of fish habitat by using stream courses as travel routes and diverting or blocking water flow at small stream channel crossings.

Evaluation of Results

The Sitka District has posted signs at trail and stream intersections where spawning streams were used as travel routes. Their action has reduced this damaging practice. Peer group education is being provided by the local ATV club, which has reduced impacts to vegetation in the Iris Meadows area. An education plan is being developed to present to schools in conjunction with the local ATV club. A management plan addressing Kruzof Island ATV use will be initiated in 2003.

The Yakutat District has conducted education efforts in the junior and senior high schools in the community. They also developed an educational video for public and school use in partnership with the Yakutat Tribe, Alaska Department of Fish and Game, and the Forest Service. They are also initiating an ATV management plan for the Yakutat Forelands.

The districts on Prince of Wales Island have requested funding to implement a meaningful inventory and monitoring effort to determine the extent of the resource impacts on that island due to ATV use.

Research

Goal: Continue to seek out and promote research opportunities that are consistent with identified information needs.

Objective: Cooperate with PNW in pursuing the high priority information needs identified in Appendix B of the Forest Plan through the intra-agency agreement entitled "Joint Studies for Improved Future Tongass National Forest Planning" and other means.

Background: Appendix B of the Forest Plan identifies priority research important for further Forest Plan amendment or revision, and lists additional data and information needs that will help to implement the Forest Plan. While not essential to the completion of the Forest Plan, results of the priority research items, before the completion of the next revision of the Forest Plan, will substantially strengthen the scientific information base needed to support alternative development. An important element of the priority research items and additional information needs is an "adaptive management" feedback loop to evaluate current plan direction, design monitoring programs to measure effects, and adjust future management activities to better address economic, social, and environmental concerns on the Tongass.

Research Question: Have identified high-priority information needs been fulfilled?

Monitoring Results

The following is a summary of the progress and significant results from research studies addressing high priority information needs and other information needs. Listed for each applicable priority need is the research need stated in the Forest Plan, Appendix B, followed by a statement that briefly describes the focus of the research.

Question 1: Timber Productivity and response to harvest of forested wetlands in Southeast Alaska.

Forest Plan Objectives: A) Examine the response of forested wetlands following timber harvest on Kaikli, Karheen, Kitkun, and Maybeso Series soils and a Lithic Cryosaprist soil; and B) document the effects of timber harvest on stocking (tree numbers, species, distribution) and growth response (timber volume).

This project was the first research need listed in Appendix B of the 1997 Forest Plan. The fieldwork and draft write up was done in 1999. Findings were published in the *PNW Science Findings*, Issue 41, February 2002. This study was also mentioned in the Western Journal of Applied Forestry.

The original purpose of this study was to determine if regeneration and growth of trees after cutting on forested wetlands could produce wood greater than the minimum USDA Forest Service standard for commercial timberland. The study showed that these sites do produce wood in sufficient quantity to be included in the timber base. No more work will be done on this project at this time.

Question 2: Determine the relationship between socioeconomic conditions in rural communities and resource allocations on the Tongass National Forest.

Forest Plan Objectives: (A) Develop baseline data to better identify the social and economic conditions within Southeast Alaska communities. These conditions include perceived needs and desires of local residents as well as basic social and economic trends.

(B) Determine linkages between resource allocations and social and economic conditions in Southeast Alaska communities on the Tongass National Forest.

(C) Test the applicability of current social and economic models to Southeast Alaska communities.

(D) Determine effects on National Forest planning decisions (Forest Plan) on these community-level conditions and desires focusing on changes related to plan implementation. This information

need covers a lot of territory. It is very broad and inclusive. Several studies have approached answering some of the needs and as follows.

Objective A was not fully covered as listed above but a poll was taken in 1998 and 1999 asking the interviewed people what their opinion was of 8 harvest treatments at Hanus Bay (The ATC work). Twenty-seven people were interviewed. The responses differed based on individual preferences, as would be expected.

Conclusions:

1. Visual appearance and effects on ecosystems and human communities are important considerations in evaluating acceptability of forest priorities.
2. Respondents favored lower levels of harvest with minimal disturbance to other resources.
3. The study demonstrates both the complexity and sophistication of peoples evaluation of forest management activity.

Objective B determines linkages between resource allocations and social and economic conditions in Southeast Alaska communities on the Tongass National Forest.

The results of several studies have been published showing what happens in communities where pulp mills and sawmills shut down. These mill closures are not directly related to resource allocation but there is a connection. Some communities do better economically when a closure takes place in the town. Economic diversity means fewer detrimental effects. Personal income and populations both dropped after mill closures in much of Southeast Alaska.

Objectives C and D have not been explored to any extent yet.

Question 3: Determine subsistence resource patterns in Southeast Alaska.

Forest Plan Objectives: (A) Update community traditional resource patterns survey (TRUCS) through a series of community self-assessment surveys integrating standard scientific methodologies and traditional environmental knowledge; (B) Identify and monitor ongoing subsistence needs and uses through available data [e.g. Alaska Department of Fish and Game (ADF&G) surveys] and the process outlined in (A) above.

There were interviews in 1064 households in 24 communities in Southeast Alaska between 1997 and 2001. Interviews were also conducted by the ADF&G with area tribes and communities. This data was analyzed and some of the results are as follows:

a) Subsistence provides a large portion of the diet of residents.

b) Per capita harvest levels have remained consistent from 1980 to present.

c) Subsistence levels vary across the region.

d) High harvesting households take much more than they can consume.

e) There is a high reliance on marine resources.

Work is continuing on subsistence resource patterns in Southeast Alaska.

Question 4: Identify and measure the interactions between aquatic/riparian habitat and perturbations in upland areas and the response of anadromous and resident salmonids.

Forest Plan Objectives: (A) Systematically evaluate existing habitat and its relationship to salmonid populations in old-growth (unmanaged watersheds) and managed watersheds (logged watersheds).

(B) Evaluate interactions between aquatic habitat, salmonid productivity, and geomorphic processes in stream channels and in watersheds.

(C) Evaluate the effects of land management activities on geomorphic processes in high gradient channels and on downstream aquatic habitat.

(D) Further develop the fish habitat objective system used to measure changes in the natural range and frequency of aquatic habitat conditions.

Research has been done to answer most of the above questions. What happens in headwater streams does affect valley bottom fish habitat. The small streams do deliver terrestrial invertebrates to downstream fish bearing areas. Riparian forest management can influence the quantity of invertebrates transported. Streamside alder growth may support higher densities of aquatic invertebrates and supply more salmonid food. Some ATC practices may increase aquatic productivity.

Question 5: Determine the geographic and habitat distribution of endemic mammals on the Tongass National Forest.

Forest Plan Objectives: (A) For several recognized mammalian taxa with limited historical ranges, continue to document geographic extend and habitat distribution within and across islands and the mainland portion of the Tongass National Forest; (B) determine population levels and associated distribution of mammalian endemics on islands and portions of the mainland that have had timber harvest.

There have been several studies concerning the mammals of Southeast Alaska. Red backed voles and flying squirrels are presumed to represent old growth dependent species. Some of the conclusions of these studies show that Southeast Alaska has a high potential for endemism in its mammal fauna, and whose systematics are only recently beginning to be known. More work is needed here.

The two potentially "old growth dependent" species studied intensively (red backed voles and flying squirrels) do not seem to be as dependent on old growth as originally hypothesized. Flying squirrels tend to use the low volume; scrub forest and red back voles can be favored by use of pre-commercial thinning.

Question 6: Evaluate the future timber productivity of young-growth stands on the Tongass National Forest.

Forest Plan Objectives: (A) Conduct baselines studies on the future timber productivity of young-growth stands including distribution of site indexes, modeling (SEAPROG) routines, stem quality, intermediate treatments, harvesting standards, and alternative harvest systems.

(B) Evaluate these factors in terms of future timber production projections on the Tongass National Forest.

(C) Evaluate the influence of these factors on restoration and enhancement of deer and other wildlife habitat.

R. James Barbour of the PNW and others did this. The report is in draft form and is titled "*Young stand management options and their implications for wood quality and other values*." Nothing in this report mentions benefits to deer and wildlife. That will be covered under Question 7. The summary and conclusion of the study by Barbour and other is as follows:

> Four silvicultural prescriptions were simulated using the Forest Vegetation Simulator (FVS) for two site classes (Sitka spruce 90 and 60 foot height growth at 50 years) for stands in the Ketchikan Area of the Tongass National Forest in southeast Alaska. A fifth prescription combining precommercial and commercial thinning was simulated at 110 years for the high site. Revenues were based on empirical lumber recovery information and expert judgments. At a 70-year rotation, precommercial thinning [*PCT*] to 12 x 12 foot at 20 years was the best volume and revenue producing prescription on both site classes. By 110 years the precommercial thinning prescriptions had fallen behind the passive management prescription, the commercial thinning prescription in terms of revenue per unit volume on both site classes, and the combination treatment on the high site. Results were variable for revenue per acre but in general the passive management and commercial thinning prescriptions performed better than the precommercial thinning prescriptions particularly on the higher site.

The precommercial thin to 18 x 18 feet at 20 years prescription was always last or next to last in terms of revenue per acre. The choice of the "best" prescription for a particular landowner or management situation however, depends on the policy goals or management objectives. If prescriptions are chosen based solely on analyses, such as a net present value or soil expectation value, using the data presented here then the shorter rotation PCT 12 prescription at 70 years will almost certainly be selected. Under this prescription wood product options most likely will be limited to manufacture of construction lumber or structural veneer, composite or fiber products, or the export of logs for their manufacture elsewhere. Factors such as rotation length and high operating costs will probably make Alaskan manufacture of these types of products high cost producers in global markets, and serious consideration should be given to whether they will compete successfully with regions where this type of material can be grown in one-third to one-half of the time needed in southeast Alaska. The passive and commercial thinning prescriptions at the higher harvest ages will produce a different type of raw material that will be suitable to a wider range of structural and appearance products, some of which might have higher selling prices than those commanded by wood from precommercially thinned stands. Again the question of whether cheaper source of the same material might be available to global markets should be given serious consideration.

Question 7: Evaluate Alternatives to Clearcut Timber harvest on the Tongass National Forest (ATC).

Forest Plan Objective: (A) Conduct baseline studies on the effects of alternative silvicultural, logging, and regeneration systems on the ecology of late-successional commercial forest stands.

(B) Evaluate the effectiveness, operability, costs, and ability to meet management needs and social desires of these alternatives.

(C) Determine the influence of alternative silvicultural systems on restoration and enhancement of deer and other wildlife habitat.

The accomplishments so far are summarized below.

Major efforts were made during 2000 and 2001 to upgrade the permanent monuments marking the plot systems at Hanus Bay and Portage Bay. In 2002, the five-year vegetation, post-harvest leave tree assessments were made. These are planned for Portage in 2004. Vegetation data were collected with a system of permanent sample plots. We obtained detailed measurements on roughly 13,200 living and 3,500 dead trees in 27 stands. These measures include species, age, size, form, growth, micro site, and presence of damaging agents. Understory vascular plant cover and biomass were measured on these plots to characterize plant abundance, diversity, and deer forage availability.

To characterize the pre- and post-harvest composition and density of forest birds, we conducted censuses during the nesting season. We conducted the censuses at three stations within each experimental unit at three times between early May and mid-July. In FY 2001, the study was conducted at the Portage ATC site.

We examined invertebrate (terrestrial and aquatic) and coarse detritus transport from forested headwaters to downstream aquatic habitats. Fifty-two small streams representing a geographic range throughout Southeast Alaska (three ATC units – Hanus Bay, Portage Bay and Lancaster Cove, and one additional site near Juneau) were sampled with 250-m nets per 24-h intervals either seasonally (spring-summer-fall) or biweekly throughout the year. Sampling occurred in fishless reaches, and in most cases upstream of salmonid-bearing habitats. Streams at the Portage Bay ATC site were sampled in FY 2001.

The benefits to wildlife were also a portion of the ATC. Some of the findings so far are:

a) Pruning may benefit understory plant growth,

b) Pre-commercial thinning suggests benefits of individual tree selection to understory plants and forage availability, and

c) Wider spaces between trees in pre-commercial thinning favored conifer regeneration, moderate spacing favors herbaceous vegetation.

Nothing was done in 2002 on the retrospective study portion of the ATC.

Question 8: Determine Alaska timber prices and market arbitrage in the Pacific Northwest.

Forest Plan Objectives:

(A) Examine the relationship between timber prices in Alaska (sold price, Tongass National Forest [Tongass]) and timber prices in the Pacific Northwest.

(B) Describe factors common to both markets, and factors unique to each market.

(C) Review statistical models that forecast the price of timber sold in Alaska (Tongass).

(D) Based on this review, revise existing models, or develop new models that can forecast Alaska prices as a function of explanatory factors for which forecast values are available.

Studies of the market prices of logs and lumber from Alaska and the competing regions (Pacific Northwest (PNW) and British Columbia (BC)) show that Alaska is integrated, albeit imperfectly, into the same markets. This means that Alaska's cost structure compared to these other regions is important. The demand for Alaskan timber and forest products is closely linked to the production decisions and cost structure of competing regions.

Question 9: Determine prices and costs in Alaska timber production and product supply.

Forest Plan Objectives: (A) Compile data and assess patterns and trends in key factors that determine competitiveness in forest products industries; compare data for Alaska to that for the Pacific Northwest, Canada, and major overseas competitors.

(B) Conduct a preliminary analysis to estimate export supply relationships for Alaska, to determine the change in quantity exported in response to changes in export and domestic prices, costs, exchange rates, and other factors.

(C) Review the data from the Tongass on logging costs and timber availability; if possible, develop a preliminary method to incorporate these data in projections of demand for Tongass timber.

The answer to this need was basically given in research Question 8. Alaska's timber markets are integrated with those of the Pacific Northwest and BC. In 1994 our harvest costs were higher than the PNW but lower than BC. Our manufacturing costs were higher than either the PNW or BC. Our total cost of lumber production was also higher than the PNW or BC. The same relationships are probably true today. Alaska can produce profitably certain types of wood products because of the scarcity value of some of the better species and log grades in Southeast Alaska.

Question 10: Study lumber recovery of second growth timber from Southeast Alaska.

Forest Plan Objectives: (A) Conduct a baseline lumber recovery study on second-growth western hemlock and Sitka spruce from Southeast Alaska. This will provide estimates of the timber volume, lumber volume by grade, and lumber value recovery by diameter class species; (B) evaluate the characteristics of second-growth timber (wood density, juvenile wood, etc.) for tier significance in the products potential of trees from Southeast Alaska.

This was covered under a study which resulted in a paper entitled "*Volume Recovery, Grade Yield, and Properties of Lumber from Young-Growth Sitka Spruce and Western Hemlock in Southeast Alaska*" by Christiansen et al.

This study accomplished the objectives and showed that lumber sawn from young-growth Sitka spruce and western hemlock in Southeast Alaska appears to be best suited for structural light framing or molding and millwork based on visual grading rules and mechanical properties observed. In this study, which applied export standards, more than 90 percent of the lumber was

graded as No. 2 or better. Bending properties were found to be excellent for this young-growth resource. All grades for both species matched or exceeded published bending MOE values for these species. MOE means "Modules of Elasticity" and is a value expressing the bending strength of wood. Differences in volume recovery, grade yield, and bending MOE due to thinning were either lacking or small. Further research is needed to explore the effects of precommercial thinning on wood quality.

Other research activities that are related to the Forest Plan

1. Scientists, statisticians, and other resource specialists have been working on a mapping and classification tool to describe the forests on the Tongass. A publication describing this is the Pacific Northwest Experiment Stations' PNW-GTR-482.
2. Goshawk studies – There are several studies on this R-10 species of concern. The research is attempting to determine the population, habitat, and needs of the goshawk in Southeast Alaska.
3. Inventory of vegetation in Southeast Alaska – There has been a continuing inventory of forest resources on the Tongass since the 1950's. This continuous inventory helps the Resource Planning Act (RPA) assessments and determines allowable harvest rates and forest health. The information is a base for resource management.

The priority information needs are broad statements and what are listed under each one in this section are specific studies connected to each need. The preceding list of priority research connected with the Forest Plan is not the only research related to the Tongass. There are other studies conducted by the Pacific Northwest Forest Experiment Station (PNW-ES) and the National Forest System (NFS, R-10) which also increase the knowledge about the forests of Southeast Alaska.

Cooperation

Cooperation between the PNW-ES and the Alaska Region has been very good. There is a committee of members from each group that decides, which type of research is needed to assist in managing the Tongass through the Forest Plan. This collaborative process is different than you may expect because it addresses the need for developing a working relationship between the Tongass and research when both parties are contributing to the acquisition of new knowledge. There is more to be done, but, so far, the research needs stated in the Forest Plan are being met.

Scenery

Goal: Provide Forest visitors with visually appealing scenery with emphasis on areas seen along the Alaska Marine highway, popular small boat routes and use areas, State highways, major Forest roads, major recreation facilities and from popular recreation places. Recognize that in other areas where landscapes are altered by management activities, the activity may visually dominate the characteristic landscape.

Objectives: Manage the scenery of the Forest in order to achieve the following visual quality objectives:

- Retention – 4.8 million acres plus acres of Retention in Wilderness;
- Partial Retention – 3.2 million acres;
- Modification – 0.4 million acres; and
- Maximum Modification – 2.8 million acres.

Background: Each land use designation (LUD) in the Forest Plan has a corresponding visual quality objective that defines maximum levels of visual impact desirable from human-induced alterations to the natural landscape character. Associated with each objective is a set of recommended guidelines that includes unit size ranges and type of harvest treatment for different visual absorption capability settings. Also part of the FORPLAN modeling process includes a set of guidelines that define roughly how much of a viewshed (or logical part of a viewshed segment) can be in a "disturbed" condition and still meet the visual quality objective. This monitoring effort is intended to assess whether these guidelines, as applied, actually result in meeting established visual objectives.

Definitions:

Harvest treatment – clearcut, group selection, single-tree selection, and diameter-limit partial cut.

Visual Absorption Capability (VAC) – the ability of a landscape to absorb human-caused alterations without changing the natural character of the landscape. There are three classifications – Low, Intermediate, and High. Low VAC landscapes are generally those with steep slopes, minimal terrain, and vegetative diversity. High VAC landscapes are those with gentle slopes, and/or high terrain and vegetative diversity.

Scenery Resource Question: Are the standards and guidelines effective in attaining the adopted Visual Quality Objectives established in the Plan?

The Forest Plan monitoring and evaluation criteria for determining the effectiveness of the Scenery standards and guidelines are generally adequate to meet the different visual quality objectives in different types of landscapes. The standards and guidelines are associated with the harvest unit size, type of silvicultural system used, amount of dispersal between units, and the overall percent of viewshed disturbed.

The Forest Plan directs that a representative set of viewsheds across the Forest that has been harvested during implementation of Forest Plan standards and guidelines are selected for evaluation and monitoring. The viewsheds selected should be associated with the use areas or travel routes on the Visual Priority list identified in the Forest Plan. The viewsheds should include areas representing the different characteristic landscapes and different Visual Absorption Capability settings. Monitoring should also include assessing the effectiveness of alternatives to clearcutting management. Monitoring and evaluation reporting should occur three to five years following adoption of the Forest Plan and at approximately five-year intervals thereafter.

In 1999, extensive monitoring was undertaken on the Tongass to assess the adequacy of the scenery standards and guidelines in the Forest Plan. Four viewsheds were analyzed across the Tongass. The results were documented in the 1999 Forest Plan monitoring report and are summarized below:

Size guidelines for forest canopy openings:

- Maximum Modification VQO in Intermediate and High VAC settings – the plan guidelines appear appropriate at 80 to 100 acres.
- Modification VQO in Intermediate VAC settings – the plan guidelines at 40 to 60 acres appear excessive. 30 to 50 acre units seem more appropriate in meeting the VQO.
- Modification VQO in Low VAC settings – the plan guidelines at 15 to 40 acres appear excessive. 10 to 30 acre units seem more appropriate in meeting the VQO.
- Partial Retention VQO in Low VAC settings – the plan guidelines at 5 to 10 acres appear excessive. 3 to 6 acre units seem more appropriate in meeting the VQO.
- No size guidelines were established for areas in which partial harvesting techniques are employed. Monitoring of harvested areas using alternatives to clear cutting techniques is demonstrating that leaving 25% of the stand in unharvested islands and leaving 33% of the remaining trees results in openings that are natural appearing or spear to blend into the surrounding landscape. Future monitoring will also focus on this type of harvesting in order to develop additional plan guidelines.

Percent Allowable Visual Disturbance guidelines:

- Maximum Modification VQO in Intermediate and High VAC settings – the plan guidelines at 50% appear excessive. 30 to 35% may be more appropriate in meeting the VQO.
- Maximum Modification VQO in Intermediate and Low VAC settings – the plan guidelines at 50% appear excessive. 20 to 30% may be more appropriate in meeting the VQO.
- Partial Retention VQO in Low and Intermediate VAC settings – the plan guidelines at 8% appear appropriate in meeting the VQO.

Additional monitoring will be necessary to determine the validity of the conclusions reached from this single monitoring effort and whether changes to the Forest Plan Standards and Guidelines need to be made. Landscapes are variable, and hence require different design techniques and flexibility in the application of unit size and cumulative visual disturbance guidelines.

In 2000 and 2001, no formal effectiveness monitoring of Forest development activities based on Forest Plan scenery monitoring protocols took place similar to that which was done in 1999. In 2002, inclement weather thwarted scheduled monitoring attempts of the Kuakan Timber Sale activities on Deer Island, south of Wrangell. Scenery resource monitoring requires clear weather to allow photographic documentation from established viewing points.

Since the adoption of the Forest Plan in 1997, all sales harvested meet the Forest Plan's scenery Standards and Guidelines. Some small timber sales, like the Kuakan Timber Sale, south of Wrangell, and the Todahl Timber Sale, north of Petersburg in Frederick Sound, have been recently implemented which were planned using the current Forest Plan's standards and guidelines. These harvested areas will be the focus of future monitoring activities to determine if the results of this harvest can adequately address the Forest Plan monitoring question. Funding for monitoring activities, however, appears to be limited at this time. Therefore, the amount of formal monitoring conducted in these possible areas will depend upon the level of funding allocated.

Soil and Water

Goals: Maintain soil productivity and minimize soil erosion from land-disturbing activities. Minimize sediment transported to streams from land-disturbing activities. Maintain and restore the biological, physical, and chemical integrity of Tongass National Forest waters.

Objectives: Attain Alaska Region (R-10) Soil Quality Standards. Attain State of Alaska Water Quality Standards.

Background: Implementation of Soil and Water standards and guidelines is necessary to maintain soil productivity and water quality. The Soil and Water standards and guidelines are implemented as Best Management Practices (BMPs) described in FSH 2509.22. Region 10 Soil Quality standards are documented in FSM 2554. Methods for effectiveness monitoring of Soil Quality standards are also referenced in FSM 2554. Soil conservation practices are practices used to ensure that ground-disturbing activities will meet the R-10 Soil Quality standards. Typical soil conservation practices include log suspension requirements in timber harvest units and the use of full-bench and end-haul road construction techniques on landslide-prone terrain. Implementation monitoring evaluates whether or not soil conservation practices were required and implemented. Effectiveness monitoring determines whether the soil conservation practice used kept the ground-disturbing activity within the R-10 Soil Quality standard.

The State of Alaska Water Quality Standards set standards for chemical, physical, and biologic parameters of waters on National Forest System Lands. The Forest Service in Region 10 uses Best Management Practices and site-specific prescriptions to meet State of Alaska Water Quality Standards when implementing ground-disturbing activities on National Forest System lands.

Soil and Water Question 1: Are the standards and guidelines for Soil Disturbance being implemented?

The Best Management Practices (BMPs), described in the Soil and Water Conservation Handbook (Forest Service Handbook 2509.22, October 1996), define practices that protect soil and water resources. The Soil and Water standards and guidelines define site-specific measures to protect the resources. These standards and guidelines were monitored following a methodology described in the Tongass Monitoring Strategy. The strategy was developed to provide direction for Tongass Land Management Plan implementation monitoring.

The *Tongass Best Management Practice Implementation Monitoring Report: Fiscal Year 2002* provides details on how the monitoring was conducted. This report is available upon request. Additional information on the implementation monitoring is described in Soil and Water Question 3. A summary of the findings for the soil resources relative to disturbance is given below.

The BMP implementation monitoring included two distinct efforts: (1) 100 percent monitoring of the units closed out and roads final completed, and (2) Interdisciplinary Team (IDT) monitoring. The 100 percent monitoring was conducted primarily by Forest Service sale administrators and engineering representatives, with assistance from resource specialists in a few circumstances. The IDT monitoring was conducted by a team of representatives from the Forest Service and other Federal and State agencies, which included sale administrators, engineers, foresters, planners, and resource specialists from soils, water, and fisheries.

Monitoring Overview

The quality control IDT monitoring was conducted on a sample made up of more than 10 percent of units and roads monitored during the 100 percent monitoring effort. Due to low timber market values and timber sales delayed due to financial legalities of the timber sale operators combined with delays related to injunctions issued in the 1997 Forest Plan litigation of Sierra Club et.al., the number of units harvested and roads constructed/ reconstructed in fiscal year 2002 was limited.

During the 10% IDT quality control, the units and roads on the Petersburg and Ketchikan/ Misty Ranger Districts were visited in fiscal year 2002 as noted below.

Petersburg Ranger District: August 21-23; Mitkof Island; South Pass Timber Sale, Unit 148; South Lindenberg Fish Pipe Replacement Project, Road 6350, culverts at mile post (MP) 4.60 and 4.70

Petersburg Ranger District: August 28; Mitkof Island; Mitkof Fish Passage Improvements, Road 40000, culverts at MP 2.492 and 3.337

Ketchikan Ranger District: August 28-30; Revillagigedo Island, Salty Timber Sale, Units 1 and 2; AK DNR monitored Whipple Creek Timber Sale units and road

Evaluation of the BMP monitoring for fiscal year 2002 shows that 16 units were in the unit pool and 18 roads/ road segments. The IDT monitored 3 of these units and 2 road segments. The 10% quality control threshold was exceeded through the IDT monitoring in 2002. Of the 377.26 acres of harvested units monitored, 65 acres were monitored by the IDT.

Monitoring Results

The monitoring showed that the Tongass National Forest is implementing the standards and guidelines for soil disturbance successfully. In a few cases, following the monitoring, action plans were developed to complete additional work to fully implement the BMP.

BMPs Applicable to Soil Disturbance

BMP 12.17 Re-vegetation of Disturbed Areas

BMP 13.5 Identification & Avoidance of Unstable Areas

BMP 13.9 Yarding Systems to Protect Soil/ Water Resources

BMP 13.10 Landing Location & Design

BMP 14.7/ 14.12 Measures to Minimize Mass Failures/ Control of Excavation & Sidecast

A total of 16 units and 18 roads were monitored this year through the 100 percent implementation monitoring process. A subset of the total BMP implementation monitoring pool, consisting of 3 units and 2 road segments, was monitored during the 10 percent IDT monitoring process. The tables discussed below reflect results from the total units and roads monitored in the 100 percent and 10 percent IDT monitoring efforts. Table 2-29 shows the number of times the BMPs specific disturbance to soil were monitored, BMPs were implemented and corrective actions taken.

Table 2-29. Summary of BMP Use, Number of Departures, and Corrective Actions from Implementation Monitoring*

BMPs Applied	100 % Monitoring Effort		10 % Monitoring Effort	
	Number of Times the BMP was Appropriate for Use	Number of Times Corrective Action Implemented	Number of Times the BMP was Appropriate for Use	Number of Times Corrective Action Implemented
12.17	4	0	0	0
13.5	5	0	1	0
13.9	14	0	3	0
13.10	14	0	3	0
14.7/ 14.12	13	3	1	1
	50	**3**	**8**	**1**

*Due to the small size of the salvage units on one sale, the 3 units were rated in one group; there were 14 forms submitted that documented 100% monitoring of 16 units. Grouping of monitoring documentation also occurred on the Petersburg culvert replacement sites where sites from 2 roads were combined. There were 18 roads rated on 17 forms.

Summary details on the monitoring by BMP are listed in the *Tongass Best Management Practice Implementation Monitoring Report: Fiscal Year 2002*. In order to comply with the standards and guidelines, corrective actions were taken during timber sale administration and administration of the public works roads and fish improvement project contracts.

Summary of Monitoring Results

The monitoring showed that the Tongass National Forest is implementing the Standards and Guidelines for protection of Soil and Water Resources. Per definition in the Tongass monitoring guidelines departure is a qualitative term associated with a rating of 1 or 2 (in a rating system of 0-5 where 5 is the highest level of positive implementation. Corrective actions are defined as actions completed to mitigate situations that occur during implementation. Emphasis items are situations identified that compromise absolute positive implementation. There were no departures (ratings of 1-2) from full implementation that were noted; although, a few cases of less than 100% implementation were noted. Some corrective action was implemented during contract administration. In a few cases, following the monitoring, action plans were developed to complete additional work to fully implement the BMP. The IDT monitoring data showed the overall same results of the 100% monitoring. Subsequently, the quality control monitoring validated the 100% monitoring data.

During IDT monitoring, the group noted soil, visual, timber, stream and buffer characteristics relative to the management practices. Specifically in running skyline and high lead logging units relative to soil disturbance, we completed visual monitoring of the surface and slope gradient limitations. Soil disturbance related to suspension and log landing areas was the primary focus of the review of the units harvested by running skyline systems. In the helicopter units, relative to soil disturbance we reviewed partial retention and soil scuffing.

Review of the monitoring completed in FY 2002 included some BMP issues related to soil disturbance. These issues included: minimizing soil disturbance and suspension requirements associated with steep terrain, mass failures and control of excavation and side cast. Summary of some of these topics are included in Soil and Water Question 3.

Full implementation of all the BMPs were recorded in FY2002 reflecting no departures reported during the 100% monitoring or 10% IDT monitoring. In some of the cases during administration of the timber sales and road construction contracts, corrective actions were initiated to fully implement the BMPs. Refer to the list of BMPs and respective descriptions for more details on the specific implementation in FY 2002. Brief summary of the significant issues relative to soil disturbance noted in the BMP monitoring in FY2002 follow:

BMP 13.5 Identification and Avoidance of Unstable Areas

No corrective actions were reported. Most of the steep terrain was deleted in the harvest units. Specific suspension prescriptions for the remaining steep areas were implemented.

BMP 14.7/ 14.12 Measures to Minimize Mass Failures/ Control of Excavation and Sidecast

Corrective action was reported 3 times in 100% and 1 time in IDT monitoring. Most of the significant issues relative to the Best Management Practices involved road construction through steep terrain. The BMPs were implemented through prescriptions and application of controlled blasting; full bench and end haul design in construction through steep terrain. In one section of a road, a small landslide (<0.86 acre slide with no associated impact to streams/ stream channels) was initiated. Other routes were investigated during road reconnaissance and found not to be feasible considering the objective of crossing the slope. On the road card specific application of this BMP is sited and full bench and end haul required. Mitigation and corrective action included slope stabilization and hydro seeding. In a few other areas of this same road system, rock fall occurred during blasting. Rock blasted during excavation fell to the down slope side of the road. Measures to modify blasting and minimize rock fall in the controlled blasting were implemented in these road sections. This rock fall was very localized and did not contribute to any soil, water, or timber resource impact.

Evaluation of Results

The standards and guidelines for soil disturbance are being implemented during timber sale administration and road construction. The sale administrators, engineers, and resource specialists have a strong understanding of the BMPs and actions necessary to implement the associated standards and guidelines. Continued emphasis is necessary measures to minimize mass failures and landslides. Application of partial suspension and full suspension has contributed to limit soil

disturbance. Full bench design, end haul and controlled blasting has contributed to minimize mass failures, although one landslides did occur. Seeding and slope stabilization has been effective in limiting erosion and landslides.

Refer to Soil and water Question 3 for recommendations relative to the BMP implementation monitoring process.

There were no recording form compliance issues this year relating to soil disturbance BMPs. In the past 5 years, there have been minor compliance issues associated with BMPs. In an effort to improve data quality, strict guidelines will be routed prior to the IDT review.

This monitoring question is covered in its entirety in the annual BMP monitoring report (available upon request). In this report, it is discussed in Soil and Water Question 3, Fish Question 2, and Wetlands Question 1. Further recommendations are included in Soil and Water Question 3.

Soil and Water Question 2: Are the standards and guidelines effective in meeting Alaska Regional Soil Quality Standards?

Soil and water effectiveness monitoring is completed through monitoring the soil quality standards as described in Forest Service Manual 2554, and is addressed in two parts: 1) Soil Disturbance, and 2) Landslide frequency.

Soil Disturbance

The effectiveness of Forest Plan standards and guidelines and BMPs in preventing excessive soil disturbance due to timber harvest activities has been monitored on the Tongass National Forest since the Regional Soil Quality Standards were established in 1992. A statistical review of two sets of this data taken on Prince of Wales Island was completed in 1999, and was summarized in the Year 2000 Forest Plan Monitoring Report.

Analysis of Results

The data collected on Prince of Wales Island is in general agreement with similar data collected on the Wrangell and Petersburg Ranger Districts. It clearly indicates that all timber harvest units, including cable, helicopter and shovel yarding systems, are within the established standard of less than 15 percent detrimental soil disturbance.

There is no need to continue collecting this data on routine harvest units. However, some additional monitoring may be desirable on a project-specific basis, as identified during environmental analysis.

Landslide Frequency

The objective of this monitoring effort is to determine the effectiveness of Forest Plan Standards and Guidelines for the identification and management of potentially unstable slopes.

Forest Plan (1997) Soil and Water Standards and Guidelines (1. A. 5) state that, at the Forest Plan level, slope gradients of 72 percent or more are removed from the tentatively suitable timber base due to high risk of mass movement. At the project planning level, the Forest Supervisor or District Ranger may approve timber harvest on slopes of 72 percent or more on a case-by-case basis, based on the results of an on-site analysis of slope stability.

BMP 13.5 (Identification and Avoidance of Unstable Areas)

The policy regarding the management of steep slopes has not changed appreciably on the Tongass since 1977. The former Forest Plan (Tongass Land Management Plan [TLMP] 1979) used a maximum slope of 75 percent to define suitable forestland and includes Southeast Alaska Area Guide (1977) policy #6, which states that "logging or roading will not be done on slopes greater than 75 percent unless approved in advance by the Forest Supervisor following IDT planning."

To determine how effective this standard has been in minimizing the frequency of management-related landslides, we will use the power of GIS to develop forest-wide information on landslide density and location relative to roads and managed stands, particularly those managed stands on steep slopes. Specifically we intend to quantify what has happened on those steep areas (greater than 72 percent slopes, or greater than 75 percent slopes) that we have logged since implementation of these Forest Plan standards.

A forest-wide inventory to identify, delineate, and digitize all landslides was initiated in 2001. Landslides are being digitized as an independent layer in GIS. This effort incorporates all existing project level landslide inventories, as well as the older forest-wide inventories conducted by the Forestry Sciences Laboratory. This data from former inventories is verified on aerial photographs and digitized.

Landslides were delineated on the most current aerial photos (1:15840) available. Landslide characteristics, including the initiation point of the slide, were noted (See Table 2-30). The outline of the landslides was digitized on GIS using orthophotos on the screen to facilitate mapping them

in the correct location. A label was placed at the initiation point of the landslide, and attributes of the slide were entered into Table 2-30.

Table 2-30. Attributes Recorded for Each Landslide.

Attribute	Options
Landslide type	Debris avalanche, debris torrent, or a combination of two—avalanche-torrent
Vegetation	Non-vegetated, partially vegetated, vegetated with alder, vegetated with conifer
Stream Impact	Y/N—whether or not the landslide impacted a stream
Road Related	Y/N—whether or not the landslide was obviously attributed to a road

In addition to addressing the effectiveness-monitoring question, the inventory is intended for a number of other purposes, such as for watershed assessments, watershed restoration, and project-level environmental analysis. Also, analysis of this digital landslide information in conjunction with other GIS data will provide additional insight about the relationship of mass wasting to other ecological variables including landform, bedrock lithology, elevation, aspect, soil type, and vegetation type.

During FY02, the landslide inventory was completed on most of the Wrangell Ranger District excluding wilderness areas, Mitkof and Kupreanof Islands on the Petersburg Ranger District, and a portion of Revillagigedo Island on the Ketchikan Ranger District. This area of completed inventory consists of approximately 1,493,811 acres. Of this total area, approximately 79,106 acres are in managed stands (nearly all are former clear cuts).

Monitoring Results

A total of 1,203 landslides were delineated. Approximately 9 percent of these (107 landslides) initiated in previously managed areas. The slides in managed areas averaged approximately two acres in size.

The majority of slides in managed areas were unvegetated (57%). There were also a large number of partially vegetated (less than 50% of the slide vegetated) slides (22%). Nineteen slides (18%) were vegetated in alder, and 3 slides (3%) were vegetated in conifer. Seventeen slides (16%) in managed areas were associated with roads.

The number and density of landslides within the unmanaged productive forest land is used to compare results on managed versus unmanaged forest stands. Unmanaged areas are all areas that have not been previously harvested. Productive forest land is defined here as all lands within the inventory area that is capable of producing a minimum of 20 cubic feet of volume growth per acre per year. These are identified in GIS as site classes 2,3, and 4. Approximately 60 percent of the inventoried area is productive forest land. The remaining 40 percent consist of non-forest and non-productive (scrub) forest.

The number of landslides and the density of landslides (# of landslides per 1000 acres) in unmanaged productive forest land were sorted by mass movement hazard class (MM-Haz) and are displayed in Table 2-31.

Table 2-31. Slides in Un-Managed Productive Forest Land

MM-Haz Class	Acres	# of Slides	# Slides per 1000acres
1	304,318	46	0.151
2	324,547	168	0.514
3	107,647	136	1.263
4	153,800	543	3.530
Totals	**890,312**	**893**	**1.003**

Table 2-32 shows an increasing density of landslides with increasing MM-Hazard rating. MM-hazard rating generally reflects increasing slope gradient, with MM-Hazard 4 defined as slopes greater that 75 percent gradient.

Table 2-32. Slides in Managed Stands

MM-Haz Class	Acres	# of Slides	# /slides per 1000 acres
1	35,065	10	0.258
2	30,267	51	1.685
3	8,904	27	3.032
4	4,870	19	3.901
Totals	**79,106**	**107**	**1.352**

The number of landslides and the density of landslides (# of landslides per 1000 acres) in managed stands were sorted by mass movement hazard class (MM-Haz) and are displayed in Table 2-33. In these formerly harvested stands, the density of landsides also increases with increased MM-Haz rating.

Table 2-33. Differences in Density between the Managed and the Unmanaged Areas.

MM-Haz Class	Increase in # of Slides per 1000 acres
1	+ 0.134
2	+ 1.171
3	+ 1.767
4	+ 0.371
Total Area	+ 0.349

The density of landslides is greater in managed stands than it is in the unmanaged area for all four mass movement hazard classes. If we assume that the density of slides in the unmanaged productive forestland represents a natural background level of disturbance from landslides, then we could attribute the difference in density to be the result of management activities.

Evaluation of Results

Soil map units that have slope gradients greater than 75% are rated as MM-Haz 4. The Forest Plan standard requiring on site investigation and special approval of harvest on slopes greater that 72 % applies to soil map units rated as MM-Haz 4.

It is interesting to note that, while the density of landslides is greatest on the hazard class 4 areas for both managed and unmanaged sites, the management related increase in landslide density is notably less on hazard class 4 areas than it is on all other classes. Reasons for this trend are unclear. The effectiveness of this Forest Plan standard should not be evaluated based on this limited preliminary information. The landslide inventory needs to be expanded to other areas of the Tongass and the data rigorously analyzed before conclusions can be drawn.

Soil and Water Question 3: Are Best Management Practices being implemented?

The Best Management Practices (BMPs) were monitored on the Tongass National Forest, using guidelines described in the Tongass Monitoring Strategy. The strategy was developed to provide direction for Forest Plan implementation monitoring. An interagency team of representatives from the Forest Service and Alaska Department of Environmental Conservation selected specific BMPs to monitor, based on potential risk factors to soil and water resources. Members of the Monitoring and Evaluation Group (IMEG) then reviewed and provided a consensus recommendation on the set of BMPs to monitor. The BMPs evaluated can be found in the Soil and Water Conservation Handbook (Forest Service Handbook 2509.22, October 1996). The relationship of the BMPs and Tongass Monitoring Strategy is briefly described in Soil and Water Question 1.

The monitoring showed that the Tongass National Forest is implementing the Best Management Practices successfully. There were no departures from full implementation that were noted. In a few cases, following the monitoring, action plans were developed to complete additional work to fully implement the BMP.

Best Management Practice Implementation Monitoring

The BMP implementation monitoring included two distinct efforts as outlined in Soil and Water Question 1: (1) 100 percent monitoring of the units closed out and roads completed, and (2) 10 percent interdisciplinary team (IDT) monitoring. Reference to this question should be made for details on the relationship of the 100% monitoring and quality control 10% IDT monitoring efforts.

The quality control IDT monitoring was conducted on a sample made up of more than 10 percent of units and roads monitored during the 100 percent monitoring effort. Due to low timber market values, timber sales delayed due to financial legalities of the timber sale operators combined with delays related to injunctions in the 1997 Forest Plan litigation of Sierra Club et. al., the number of units harvested and roads constructed/ reconstructed in fiscal year 2002 was limited. At the time of the selection of units and roads for the 10% quality control sample there were only 5 road segments where construction / reconstruction was completed and 8 units near final acceptance. This activity was limited to Prince of Wales Island, Revillagigedo Island, Mitkof Island and Kupreanof Island. Originally we planned to visit all 4 geographic areas in the IDT review; however due to funding constraints associated with fire suppression and weather, we had to limit our visits to 3 trips in 2 geographic areas. (We scaled back the size and number of the IDT quality control trips.) We were unable to complete the large group trips planned to look at applications of standards and guidelines associated with culvert replacements as well as management of young growth timber on Prince of Wales Island. The large group trip would have provided opportunity for review beyond the requirements of the 10 % IDT quality control sample required by the monitoring protocol.

During the 10% IDT quality control the units and roads on the Petersburg and Ketchikan/ Misty Ranger Districts were visited in fiscal year 2002 as noted below.

Petersburg Ranger District: August 21-23; Mitkof Island; South Pass Timber Sale, Unit 148; South Lindenberg Fish Pipe Replacement Project, Road 6350, culverts at MP 4.60 and 4.70

Petersburg Ranger District: August 28; Mitkof Island; Mitkof Fish Passage Improvements, Road 40000, culverts at MP 2.49 and 3.33

Ketchikan Ranger District: August 28-30; Revillagigedo Island, Salty Timber Sale, Units 1 and 2

Evaluation of the BMP monitoring for fiscal year 2002 shows that 16 units were in the unit pool and 18 roads/ road segments. The IDT monitored 3 of these units and 2 road segments. The 10% quality control threshold was exceeded through the IDT monitoring in 2002. Of the 377.26 acres of harvested units monitored, 65 acres were monitored by the IDT.

The monitoring showed that the Tongass National Forest is implementing the Standards and Guidelines for protection of Soil and Water Resources. There were no noted departures from full implementation. Some corrective action was implemented during contract administration. In a few

cases, following the monitoring, action plans were developed to complete additional work to fully implement the BMP.

Monitoring Context

Planning for some of the roads and units was completed before the Soil and Water Conservation Handbook was revised in October 1996, and new Forest Plan Standards and Guidelines were approved in May 1997. Both documents included many improvements for protecting soil and water resources. Important changes in the 1996 Soil and Water Conservation Handbook included improving wetlands management direction, considering stream buffer wind throw, and generally making Forest Service BMPs consistent with State Forest Practices Regulations. A few of the important changes included in the 1997 Forest Plan FEIS and the revised Forest Plan Standards and Guidelines resulted in new stream class definitions, and stream protection measures required for each stream class and channel type. Buffer protection of Class III streams was entirely new. A number of the units monitored were planned, laid out, and harvested under pre-1997 Forest Plan Standards and Guidelines.

BMPs Monitored in FY 2002

BMP 12.5 Wetlands Protection Measures

BMP 12.6/ 12.6a Riparian Area Designation & Protection/ Buffer Zone Design and Layout

BMP 12.7/ 14.5/14.8 Measures to Minimize Surface Erosion

BMP 12.8/ 12.9 Oil Pollution Control Measures

BMP 12.17 Re-vegetation of Disturbed Areas

BMP 13.5 Identification and Avoidance of Unstable Areas

BMP 13.9 Yarding Systems to Protect Soil/ Water Resources

BMP 13.10 Landing Location and Design

BMP 13.11/ 13.14/ 14.5 Erosion Control Measures for Units & Temporary Roads

BMP 13.16 Stream Channel Protection

BMP 14.6 Timing Restrictions for Construction Activities/ Fisheries Prescription

BMP 14.7/14.12 Measures to Minimize Mass Failures/ Control of Excavation & Sidecast

BMP 14.9 Drainage Control Structures to Minimize Erosion & Sedimentation

BMP 14.14/ 14.17 Design & Installation of Bridges and Culverts

BMP 14.15 Diversion of Flows Around Construction Sites

BMP 14.18 Control Rock Pit Sediment

BMP 14.20/ 14.22 Road Maintenance Access Management

BMP 14.26/ 14.27 LTF Surface Erosion Control Plan, Storm Water Pollution Prevention Plan

During IDT monitoring, the group noted soil, visual, timber, stream and buffer characteristics relative to the management practices. The logging systems and focus characteristics monitored are listed below:

- Helicopter logging: leave trees, soil disturbance, stream buffers and stream disturbance
- Running skyline and high lead logging: streams, buffers, wetlands, and soil disturbance

In the road review, the IDT group looked at the reconstruction and construction. The focus characteristics monitored are listed below:

- Reconstruction of the culverts and bridges: fish passage and erosion control
- Timber roads: sediment control, and culvert installation

Monitoring Overview

The data summarized in the table and discussed below reflect results from the total units and roads monitored in the 100 percent and IDT monitoring efforts. This monitoring covered 377 acres in 16 harvest units and 18 roads. Details of the monitoring of the Best Management Practices are included in the *Tongass Best Management Practice Implementation Monitoring Report: Fiscal Year 2002*, which is available upon request.

Reviewing the timber sales and respective environmental documents most of the units were harvested under contacts that were included in EISs or EAs that were signed before the new Tongass Land Management Plan Revision in 1997. The units and roads in the FY 2002 monitoring pool are listed below with their respective EIS/ EAs or contracts. The small sales and public works contracts were all implemented under the revised Standards and Guidelines.

Table 2-34. Units Monitored in FY 2002 through BMP Implementation Monitoring Process

Units	Timber Sale; EIS/ EA (decision year)
429-14	Shamrock TS; Shamrock EIS (1996)
140	South Central TS; South Lindenberg EIS (1996)
60	South Saddle TS; South Lindenberg EIS (1996)
436-23, 436-61; 438-22	Four Leaf TS; Shamrock EIS (1996)
1*, 2*, 5	Salty TS; Salty EA (2000)
148*	South Pass TS; South Lindenberg EIS (1996)
1a, 1b, 1c	Rolling Rock TS; Polk Small Sales
1	Fork TS; Polk Small Sales
1	Micro TS
1	Little Naukati Salvage TS; Priority Windthrow

* Units monitored by IDT

Table 2-35. Roads Monitored in FY 2002 through BMP Implementation Monitoring Process

Roads	Road Contract/ Timber Sale
6354 Reconstruction	South Saddle TS; South Lindenberg EIS (1996)
6350* Reconstruction	South Lindy TS; South Lindenberg EIS (1996)
43506	South Lindy TS; South Lindenberg EIS (1996)
2160980, 2160982, 2160985, 2160986	South Arm TS, Chasina TS (1998); Public Works
3030850, 2054300, 2054000, 3000000	POW Fish Pass Improvement; Public Works Contract
6314	Four Leaf TS; Shamrock EIS (1996)
6415 Relocation	Public Works Contract
45906	Four Leaf TS; Shamrock EIS (1996)
40000 Reconstruction	40000 Resurfacing Public Works Contract
6209 Reconstruction	6209 Resurfacing; Public Works Contract
40000* & 6235000 Mitkof Fish Passage	Mitkof Fish Passage Culvert Replacement; Public Works

* Road 6350 MP 4.6, 4.7; Road 40000 MP 2.42, 3.337 monitored by IDT

The implementation monitoring results are summarized in Table 2-35. This Table displays the total number of times each specific BMP was rated, the number of times full implementation was monitored, and the number of times corrective actions were implemented. Per definition in the Tongass monitoring guidelines departure is a qualitative term associated with a rating of 1 or 2 (in a rating system of 0-5 where 5 is the highest level of positive implementation). Corrective actions are actions completed to mitigate situations that occur during implementation. Emphasis items are situations identified that compromise 100% implementation. In FY 2002, there were no departures (ratings of 1-2) from full implementation that were noted although a few cases of less than 100% implementation were noted. In some cases, corrective action was taken so that the BMP was fully implemented before the unit or road was approved by either the sale administrator or contracting officers representative. Some of the corrective actions were emphasis notes relative to BMP implementation but action activity was not warranted. In a few cases, the monitoring resulted in action plans being drawn up to complete additional work so the BMP was fully implemented.

Comparison of the data in Table 2-36 shows that a number of corrective actions relative to BMP 12.8/ 12.9, 14.7/ 14.12 and 14.9 were reported during the monitoring process that were not reviewed by the IDT. This table also shows the IDT monitored a number of the sites corrective actions were taken in implementing BMP 12.5, 12.7/14.5/14.8, 12.8/ 12.9, 14.7/ 14.12 and 14.9. The IDT monitored 41% of the sites where corrective actions were applied to implement the BMPs.

Table 2-36. Summary of BMP Use, Number of Departures, and Corrective Actions from Implementation Monitoring *

BMPs Applied	100 % Monitoring Effort		10 % Monitoring Effort	
	Number of Times the BMP was Appropriate for Use	Number of Times Corrective Action Implemented	Number of Times the BMP was Appropriate for Use	Number of Times Corrective Action Implemented
12.5	21	1	4	1
12.6/ 12.6a	6	0	3	0
12.8/ 12.9	28	4	5	2
12.17	4	0	0	0
13.5	5	0	1	0
13.9	14	0	3	0
13.10	14	0	3	0
13.11/ 13.14/ 14.5	11	0	3	0
13.16	13	0	3	0
12.7/ 14.5/ 14.8	15	1	2	1
14.6	9	0	0	0
14.7/ 14.12	13	3	1	1
14.9	12	3	2	0
14.14/ 14.17	12	0	2	0
14.15	0	0	1	1
14.18	12	0	1	0
14.20/ 14.22	13	0	1	0
14.26/ 14.27	15	0	4	0
	217	**12**	**39**	**6**

*Due to the small size of the salvage units on one sale, the 3 units were rated in one group; there were 14 forms submitted that documented 100% monitoring of 16 units. Grouping of monitoring documentation also occurred on the Petersburg culvert replacement sites where sites from 2 roads were combined. There were 18 roads rated on 17 forms.

Monitoring Results

Due to limitations on harvest and road construction associated with the injunction on harvest in roadless areas as well as low timber market values, very few units and roads were in the monitoring pool. Every unit and road in a status close to final acceptance that was considered ready to review was in the unit/ road pool. Since every eligible unit was considered for the review, application of the stratified random selection was not necessary. Due to constraints imposed by fire suppression, the size of the groups was limited and large group trip was dropped. Much of the unit harvest and road construction was completed in the fall and met the criteria to enter into the selection pool after the IDT monitoring completed.

During the IDT monitoring, no departures from full BMP implementation were noted on the three units and 3 road sites on two roads reviewed. Corrective actions associated with BMP 12.5 Wetlands Protection Measures, BMP 12.8/12.9 Oil Pollution Control Measures, 12.7/14.5/14.8 Measures to Minimize Surface Erosion, BMP 14.7/14.12 Measures to Minimize Mass Failures/ Control of Excavation and Sidecast, and BMP 14.15 Diversion of Flow Around Construction Sites were reported in 2002. The IDT found these corrective actions effective in contributing to full BMP

implementation. Details from these units as well as the results from the 100% monitoring are summarized by BMP in the "Description of Best Management Practices Monitored" section in the "*Tongass Best Management Practice Implementation Monitoring Report: Fiscal Year 2002*" that is available upon request. Refer to the IDT trip reports included in the report cited above for specific details from the IDT review.

During the 100% implementation monitoring effort, no departures from full BMP implementation were noted. Corrective actions associated with BMP 12.5 Wetlands Protection Measures, BMP 12.8/12.9 Oil Pollution Control Measures, BMP 12.7/14.5/14.8 Measures to Minimize Surface Erosion, BMP 14.7/14.12 Measures to Minimize Mass Failures/ Control of Excavation and Sidecast, and BMP 14.9 Drainage Control Structures to Minimize Erosion and Sedimentation were reported in 2002. The IDT rated and noted corrective action relative to BMP 14.5 Diversion of Flow Around Construction Sites. This Best Management Practice was not one of the specific BMPs selected for review in the FY 2002 BMP Implementation Monitoring suite; therefore not rated in the 100 % monitoring process. Otherwise the Sale Administrators and Engineering Representatives were consistent in noting the same corrective actions identified by the IDT. The Sale Administrators and Engineering representatives/ Contracting Officer's representatives found the corrective actions effective in contributing to full BMP implementation.

Summary of the monitoring results from the units and roads show that the implementation of the Standards and Guides were achieved through application of the Best Management Practices. Characteristics of the units significant to the BMP monitoring included buffers and stream protection measures, logging systems relative to streams protection and minimizing soils disturbance, suspension requirements associated with steep terrain, and oil pollution control measures. Characteristics of the roads specific to culvert replacement sites significant to monitoring this year included erosion and sediment control as well as design and installation of the culverts. Brief summary of a few of the situations noted and identified in the IDT and/ or 100% monitoring reports follow below.

Stream and Buffer Protection Measures

Two of the three units monitored by the IDT showed several streams within and adjacent to the units. In these units, the presale fisheries biologist designated the streams and marked them in the layout documents in most cases. There was one instance where a small class IV stream was not noted during presale work but protection was applied during sale administration (described below). The stream classifications were relatively consistent between the units and consistent with the current protocol.

Logging Systems Relative to Stream and Buffer Protection

The South Pass unit monitored by the IDT was helicopter yarded. Streams and associated buffers in this unit were protected. Since the helicopter yarding requires the logs to be full suspended, there is minimal damage potential to the streams. Helicopter yarding provides the maximum flexibility in working around buffers and leave trees. The Salty units were yarded with running skyline systems. The running skyline system employed in unit 1 provided for full suspension across the v-notches and through most of the unit. The running skyline system was designed to provide for buffers on the class II streams. Protection measures from class A, no cut 120 foot buffer with a reasonable assurance of wind firm (RAW) zone, to class C, slope break buffers on the class II streams, were implemented. Since the running skyline system is mobile, the potential impact to streams buffered from the unit and outside but adjacent to the unit was minimal. Salty unit 2 had no streams within close proximity to the unit. Soil surface disturbance resulting from logging varied from not apparent to minimal (<0.2 % surface scraped).

Minimizing Soils Disturbance, and Suspension Requirements Associated with Steep Terrain

Salty unit 2 was the only unit reviewed by the IDT with issues relative to logging on steep terrain over 72% slope gradient. Most of the areas with slopes greater than 72% slope gradient were deleted from the unit. The slope gradients varied from 20 – 80% slope gradient; with prescribed harvest on less than 1 acre steeper than 72%. This steep area was reviewed and approved for harvest by the soil scientist. Full suspension was achieved and no measurable surface soil disturbance was noted through visual observation.

Erosion and Sediment Control

End haul was implemented at two culvert replacement sites along Forest road 6350 that were completed as part of the South Lindy Timber Sale that was monitored by the IDT. The road traversed forested wetland at the culvert sites. End haul of the excavated soil material for installation of the culverts contributed to minimize impact to the wetland soils. This road was substantially complete at the time of monitoring and used for timber haul. (The road has not been final accepted for contract completion yet). Prior to final inspection, the road will be bladed to minimize surface erosion. The road cuts on this road were seeded to prevent and minimize surface erosion. The seed was growing well along much of the road. Additional seeding is planned to provide more through soil coverage. At the LTF, a new lift of rock was added to prevent surface erosion and non-point discharge transporting sediment.

Dewatering and other sediment control measures were implemented at the culvert replacement sites located at MP 2.492 and MP 3.337 on Road 40000. These culverts were replaced as part of a survey, design and replacement contract to improve fish passage. Heavy rains resulted in work delays immediately before the IDT monitoring trip. Measures to minimize surface erosion were not fully implemented at the time of review of the culvert replacement sites. Although seed had been applied, no germination was observed and bared soil was exposed. The IDT group recommended additional seeding of the bared soil slopes to prevent erosion.

Design and Installation of Culverts

The culverts replaced at MP 4.6 and 4.7 on Road 6350 were monitored by the IDT. These structures were replaced as part of the South Lindy Timber Sale. These culverts showed adequate spacing and were functional. The bottom of the culverts showed gravels transported through the natural stream process through these class II streams. Turbidity measurements were taken at these sites and showed that the water quality met the Alaska State Water Quality Standards.

A second IDT group monitored culvert sites at MP 2.492 and MP 3.337 on Road 40000. These culverts were designed using a stream simulation technique. The construction required stream dewatering to provide opportunity for effective culvert burial and placement of stream substrate in the culvert. The upstream habitat surveys of the sites were not complete at the time of the review. The process used for the design of the culverts functioned well. The sites were identified in the road condition survey as needing replacement then a process was applied to prioritize work. Reconnaissance and terrain specific calculations were completed to describe the hydrology and geomorphology for each site. Each culvert was specifically designed for each culvert.

Oil Pollution Control Measures

Emphasis on oil pollution prevention and cleanup as well as non point source discharge is reflected in the number of corrective actions reported in the 100% monitoring. The sale administrators enforced precautions to prevent soil contamination and directed the contractors to implement immediate cleanup of spilled petroleum products. The corrective actions noted were primarily clean up of minor incident type oil that was dripping from hydraulic fittings and hoses during maintenance. There were no reportable spills during timber harvest or road construction in FY 2002.

Mass Failures and Control of Excavation and Sidecast

Measures to minimize mass movement and control of excavation were applied along some steep sections of road on the South Arm timber sale road system on Prince of Wales Island. On this road system there was one landslide and a few sections of construction on steep ground where control of excavation was difficult. The natural slope configuration and rains contributed significantly to the conditions that led a small landslide on one road. Re-routing the road was not viable considering the terrain and layout criteria. A full bench design was implemented; road prism was cut into the slope with no side casting. Precautions of end haul and controlled blasting were taken during construction to attenuate the problem. Mitigation measures to limit erosion and sediment transport included hydro seeding. On the South Arm Timber Sale roads through the 70-120% + gradient slopes, full bench design was implemented. Through these full bench sections, rock debris was minimized through controlled blasting and end haul. No side casting of material was permitted on the steep sections. A few minor incidents of rock fall occurred during blasting. The rock fell in localized areas on the down slope side of the road and no impact to the soil, timber or streams was noted.

Drainage Control Structures to Minimize Erosion and Sedimentation

The culverts reconstructed for fish passage on Mitkof Island as well as Prince of Wales showed effective installation. These culverts were designed to simulate a natural stream with focus on reducing water velocity for fish passage. Construction features implemented to limit sediment transport included dewatering, settlement ponds, and catchment basins. At some of these sites the turbidity readings exceeded the State Water Quality Standards for a short period (primarily during construction). Details of the turbidity monitoring are described in the Soil and Water Question 4. Mitigation measures to minimize sediment transport included straw tubes, silt fence, geotextile fabric filters, and seeding. In a few cases on the Mitkof project additional seeding was needed and corrective action plans to provide this seeding are underway. On some of the South Arm timber sale roads additional culverts were added during construction to provide cross drainage. These culverts were installed following approved designs and construction methods.

Evaluation of Results

Generally 10 percent quality control monitoring completed by the IDT showed agreement with the monitoring completed by the sale administrators and engineering representatives. Monitoring showed that the Best Management Practices (BMPs) were implemented. The numerical rating system that was added to clarify the BMP fully Implemented/ Departure from BMP Implementation/ BMP not Implemented System worked well. This numerical rating served to clarify the split between the ratings and help the group rate the BMP implementation more consistently. The numerical system rating facilitated reflecting upon the significance of the departure and the impact on the soil, water, and timber resources. There was minimal confusion identified on completion of the forms and interpretation of the rating system; the format continued an effective tool for monitoring.

Similarity in ratings between IDT and 100 % monitoring showed no departures and corrective actions were affirmed through careful review of the monitoring forms from the BMP implementation data suites. This provides positive confirmation that interpretation of the form and rating process is relatively consistent between the two groups. Conclusion follows that integrity of the data was upheld.

During the IDT monitoring, the group noted identified strengths associated with BMP implementation and a few BMPs that need continued emphasis. Details of the monitoring are summarized by BMP in the Description of Best Management Practices Monitored section that follows. Strengths noted were associated with the following BMPs:

BMP 12.5 Wetlands Protection Measures
BMP 12.6/ 12.6a Riparian Area Designation & Protection/ Buffer Zone Design and Layout
BMP 12.7/ 14.5/14.8 Measures to Minimize Surface Erosion
BMP 12.8/ 12.9 Oil Pollution Control Measures
BMP 12.17 Revegetation of Disturbed Areas
BMP 13.5 Identification and Avoidance of Unstable Areas
BMP 13.9 Yarding Systems to Protect Soil/ Water Resources
BMP 13.10 Landing Location and Design
BMP 13.11/ 13.14/ 14.5 Erosion Control Measures for Units & Temporary Roads
BMP 13.16 Stream Channel Protection
BMP 14.15 Diversion of Flows Around Construction Sites
BMP 14.6 Timing Restrictions for Construction Activities/ Fisheries Prescription
BMP 14.14/ 14.17 Design & Installation of Bridges and Culverts
BMP 14.26/ 14.27 LTF Surface Erosion Control Plan, Storm Water Pollution Prevention Plan

Emphasis items noted were associated with the following BMPs:

BMP 12.5 Wetlands Protection Measures
BMP 12.7/ 14.5/14.8 Measures to Minimize Surface Erosion
BMP 12.8/ 12.9 Oil Pollution Control Measures
BMP 12.17 Revegetation of Disturbed Areas
BMP 14.15 Diversion of Flows Around Construction Sites

Overall the Best Management Practices are being implemented on the Tongass and these practices are serving to implement the Standards and Guidelines associated with soil and water resources. The sale administrators (SAs), engineering representatives (ERs), and contracting officer's representatives (CORs) worked with the contractors and operators and resource specialists to implement the BMPs. There were very few challenges associated with the BMP implementation this year. There were some units harvested under the old standards and guidelines in Shamrock and Four Leaf timber sales administered through the Shamrock EIS. There were a few units harvested in the South Central, South Saddle, and South Pass timber sales under the South Lindenberg EIS. The South Lindenberg Projects were revised to better achieve the riparian standards and guidelines in the revised 1997 Record of Decision. Harvest of these units met the implementation requirements of the 1997 Standards and Guidelines. Harvest of the Salty, Rolling Rock, Fork, and Micro timber sales which were administered under the 1997

Standards and Guidelines showed successful implementation of the 1997 standards and guidelines through the Best Management Practices.

Reviewing the implementation of Best Management practices associated with timber sale units and temporary roads, the implementation is continuing to improve. The sale administrators and layout foresters have worked with the fisheries biologists and hydrologists to define stream and wetlands protection in situations where streams are not identified in the planning phases of unit harvest. The sale administrators worked with layout personnel to implement this protection in the field through deletion of portions of the unit and stream protection measures. In the units monitored buffers were delineated with reasonable assurance of wind firm zones and implemented in the field. The logging systems used this year were primarily running skyline and helicopter systems with a minor amount of shovel yarding. These systems achieved full suspension in many cases and very little soil disturbance was reported. Leave trees and buffers designated were protected and intact following unit harvest. There was only a minor amount of steep terrain (over 72% slope gradient) monitored in the Four Leaf and Salty timber units. Most of the steep terrain was deleted from these units. The areas harvested were reviewed by the soil scientists and specific prescriptions for harvest implemented. Erosion and sediment control continues to be an emphasis item for timber harvest. In FY 2002, grading and blading of the roads was continuing to minimize non point source discharge. The number and spacing of cross drains was adequate to transport water across the road and limit sediment transport. Seeding was implemented on the road cuts to minimize erosion. Secondary seeding was completed in some cases to improve the percentage of bared soil covered. Focus on oil pollution and prevention continued this fiscal year. A few minor incidents of equipment leaks and drips were reported in the BMP monitoring process, although, the quantity spilled was not reportable per State and Federal regulation. Cleanup was implemented immediately and contaminated soil and absorbent materials disposed.

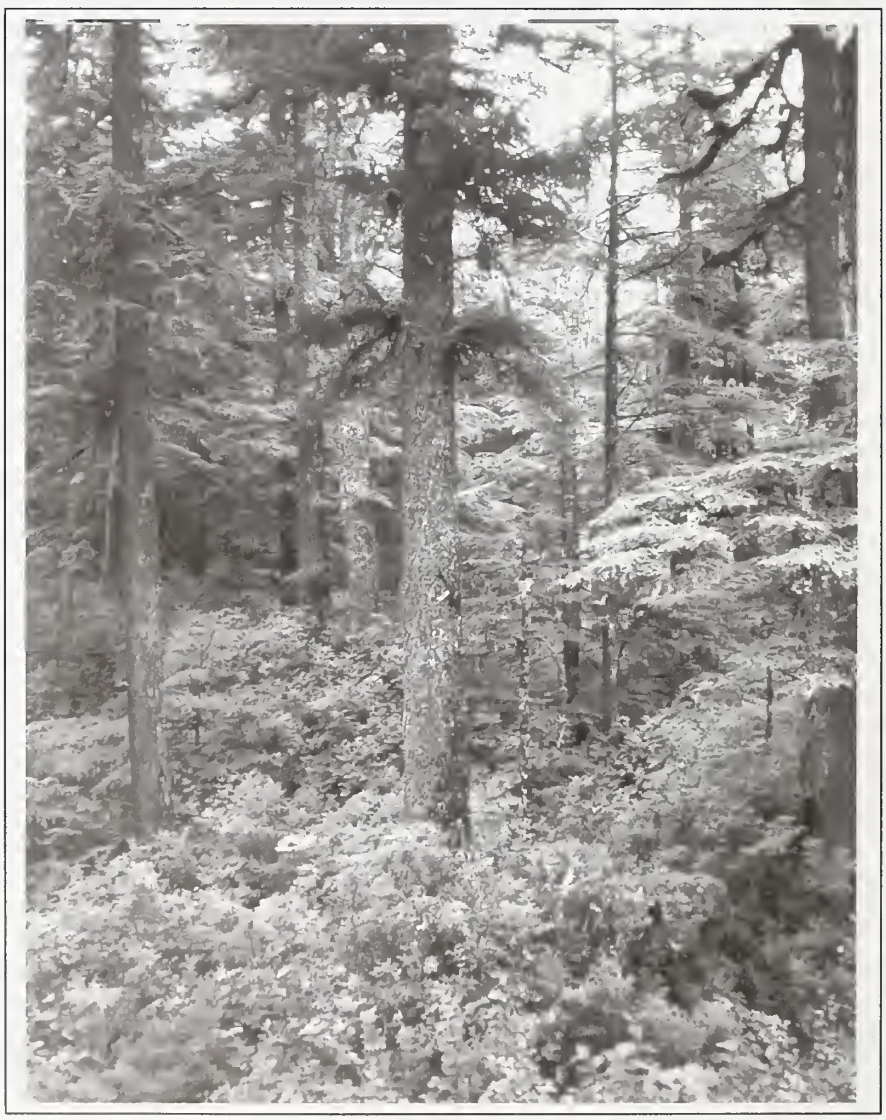
Reviewing the implementation of BMPs associated with road construction and reconstruction of culverts replaced for fish passage improvement, the implementation is continuing to improve. Specific challenges were presented in the construction through significant steep terrain and in the dewatering processes associated with culvert installation. The road construction associated with the timber sales on Kupreanof and Mitkof islands showed effective implementation of the BMPs. This construction involved end haul and/or blasting restrictions on several roads constructed through steep terrain. These methods contributed to prevent mass failures. Only one minor slump was reported associated with side casting of excavated material on these roads. Road construction on Prince of Wales Island associated with the South Arm timber sale was completed with full implementation of the BMPs; however, a few incidents of rock fall and one small (<0.86 acre) landslide was reported. Corrective actions for the slump and landslide included slope stabilization and seeding. No impact to streams or stream channels was reported. Several culvert installations were completed on the Mitkof Fish Improvement Project and Prince of Wales Fish Improvement projects. These structures were designed with stream simulation processes and included rehabilitation of the streams banks. In order to bury the structures and lay substrata in the culverts, dewatering was required. The complexity of the construction and diversion systems varied and numerous mitigation measures were employed to minimize sediment transport. Mitigation measures implemented included modifications to the diversion and dewatering structures, hoses, silt fencing, straw tubes, and natural filters. Although these measures were planned at the onset of the project and implemented, the State water quality standards for turbidity were exceeded in a few cases but most of this occurred during the 48-hour temporal period. The mitigation measures combined with natural processes contributed to decrease the turbidity and sediment transport to natural levels. Further details on the turbidity monitoring are included in Soil and Water Question 4. The Best Management Practices were successfully implemented at these sites.

Recommendations

Recommendations follow that the implementation monitoring process is continued for BMP monitoring. For rational of consistency and data set integrity utilizing the same form and procedures is highly recommended. Recommendations specific to the existing form and process include clarification of the definitions and rating system to ensure that the process is focused on

implementation monitoring. The 100% monitoring of all units and roads provides background documentation on the status of the Best Management Practice implementation. Confirmation of the implementation of the BMPs and documentation of events relative to the soil and water resource associated with corrective actions and mitigation is essential for effectiveness monitoring. This process focuses monitoring on practices that have been difficult or troublesome to implement such as seeding and class IV stream protection. Continued emphasis on relaying the information on corrective actions to the layout foresters, fisheries, and wildlife personnel is vital. Efforts to focus on this information relay have been initiated this year. Plans include correspondence and joint trips with the IDT Forest planning review team as well as the district IDT and layout groups. Due to efforts to reduce spending for fire suppression efforts, the IDT 10 % quality control monitoring will need to be kept to a minimum. The Forest will most likely not be able to afford to have both large and small group trips.

A few specific recommendations for change in the monitoring process will be addressed and evaluated. These recommendations include modifying the program to focus on fish passage culvert monitoring and focus on sites that are part of the effectiveness monitoring effort. Developing an implementation monitoring process focused specifically on culvert replacement for fish passage is important for establishing a baseline for monitoring the performance of these structures. Monitoring BMP implementation in the watersheds that are part of the long-term effectiveness monitoring set is essential. This particularly is significant in the watersheds upstream of the resident fish MIS stream reaches. This information is vital to interpreting the response data collected in these reaches.



Soil and Water Question 4: Are Best Management Practices effective in meeting water quality standards?

Goal: Protects, maintains, and restores the biological, physical, and chemical integrity of Tongass National Forest waters for the beneficial uses of drinking water, growth and propagation of fish and other aquatic and terrestrial life, and recharges wetlands.

Objective: Attain State of Alaska water quality standards forest-wide. Study a representative sample of projects where Best Management Practices (BMPs) have been implemented to determine if these BMPs are effective in meeting the State water quality criteria (eg. turbidity, sediment, and temperature) or in maintaining physical habitat condition (eg. gravel embeddedness, pool depth). This monitoring issue is closely related to the fish and riparian effectiveness monitoring information also presented in this report

Background: The Clean Water Act establishes regulatory authority for water quality within the Environmental Protection Agency (EPA) and Alaska Department of Environmental Conservation (ADEC). ADEC has established numeric criteria for water quality as Water Quality Standards (ADEC, 1999). The Forest Service must apply Best Management Practices that are consistent with the Alaska Forest Resources and Practices Regulations to achieve Alaska Water Quality Standards. The site-specific application of BMPs, *with a monitoring and feedback mechanism*, is the approved strategy for controlling non-point source pollution as defined by Alaska's Non-point Source Pollution Strategy (ADEC, 2000).

Turbidity, sediment, and temperature are considered the most likely water quality parameters to be affected by activities implemented under the Forest Plan. The Forest Plan EIS discusses sediment as the most important of these. The Forest Plan also discusses the effects of riparian timber harvest on stream temperature, but concludes that identification of temperature-sensitive streams and their management would occur during watershed analysis. The Forest Plan Fish Standards and Guidelines contain numeric criteria for maximum stream temperatures in Class I (between 50 and 68 degrees F or "natural") and Class II (below 68 degrees F or "natural") streams. However, the numeric criteria in the Alaska Water Quality Standards (ADEC, 1999) are more stringent (maximum of 55 degrees F in spawning and incubation areas, 59 degrees F in other areas). In 2002, stream temperature monitoring was conducted in selected watersheds to determine if summer stream temperatures are within State water quality standards. The latter program was developed in response to public concerns over large spawning salmon die offs that occurred in 1993.

Since 1997, BMP effectiveness monitoring has focused on individual practices such as stream buffers and measures to minimize landslides. Forest roads can have adverse effects on aquatic life resulting from accelerated erosion and sediment loading, alteration of natural drainage patterns, changes in channel morphology and increased risk of chemical spills and contamination. In 2002 water quality monitoring on the Tongass focused on the effectiveness of road BMPs in mitigating erosion and stream sedimentation because of the potentially significant effect on the growth and increase of aquatic organisms.

Under the current Forest Plan (with the exception of compliance monitoring associated with the Greens Creek Mine on Admiralty Island and permit monitoring associated with Log Transfer Facilities discussed elsewhere in this report), water quality data were not collected for purposes of evaluating BMP effectiveness until 1999, when turbidity monitoring was initiated during culvert installation in 1999.

The Forest Plan EIS discusses efforts to monitor sediment in the Tongass National Forest in the 1970s and 1980s. Conclusions with respect to the effects of forest management on sediment yields were severely limited by the inherent variability of sediment yields and short duration of these studies. Stream sediment has not been monitored in the Tongass National Forest since these efforts because it is very difficult and costly to directly measure sediment transport rates with reliability.

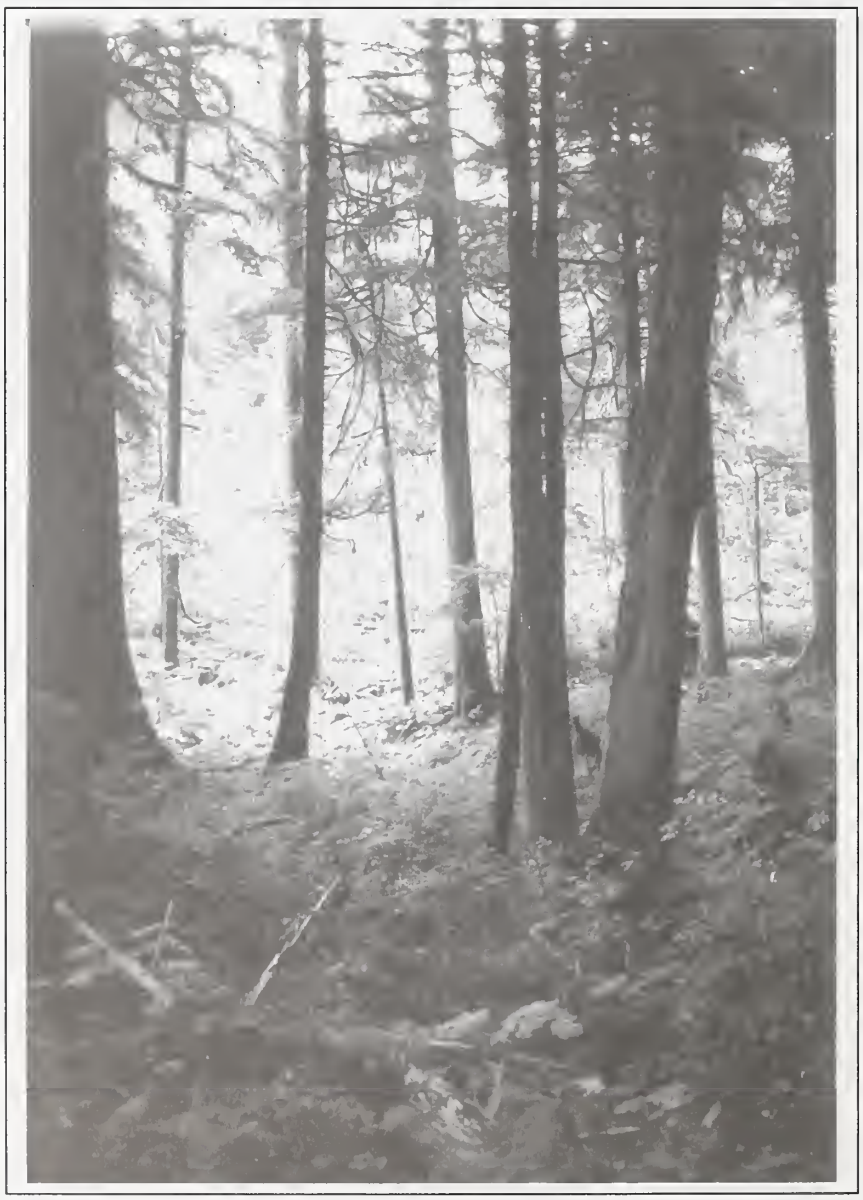
Stream temperature monitoring efforts have been underway since the early 1990s at selected sites in the southern Tongass National Forest in response to widespread adult pink salmon pre-

spawning mortality documented in the late 1980s and early 1990s. In 2000, 2001, and 2002, summary results of these data on Prince of Wales Island were included in the Tongass National Forest Annual Monitoring and Evaluation Reports. As noted in the 2002 Report, these data may correlate to fish kills; however, the current data collection protocols (including locality and site specific placement) limit the utility of the data for evaluating BMPs currently under the Forest Plan.

A study of stream temperature influences on fish kills suggests that low dissolved oxygen levels associated with very low volume stream flow is the greatest factor influencing large fish kills in Southeast Alaska (Alaska Working Group on Cooperative Forestry and Fisheries 1991). This study reported that low dissolved oxygen levels were controlled primarily by stream discharge and fish abundance (high respiration rates) and occurred even where stream temperatures were within water quality criteria.

Monitoring Results

Water quality monitoring activities reported in FY 2002 include stream turbidity associated with culvert and bridge installation, and record of the impacts of road maintenance activities on Kuiu, Prince of Wales, Kupreanof and Mitkof Islands, and stream temperature monitoring in temperature sensitive watersheds on Prince of Wales Island.



Stream Turbidity

Stream turbidity monitoring during road construction activity is a simple, low-cost observation of a water quality standard that responds to routine BMP effectiveness monitoring outlined in the USDA Forest Service Memorandum of Agreement with the Alaska Department of Environmental Conservation (1992). The objective of turbidity sampling is to determine if Best Management Practices are effective in achieving State water quality criteria for turbidity.

The waters within the Tongass National Forest are classified for multiple beneficial uses (water supply, water recreation, and growth and propagation of fish, shellfish, and other aquatic life and wildlife (Alaska Water Quality Standards 18 AAC 70.020,1999 as amended, 2002). If water bodies are protected for more than one use class, the most stringent water quality criteria for all included use classes apply. The most stringent criteria for turbidity is that samples

> "...may not exceed 5 NTU (nephelometric turbidity units) above natural conditions when the background turbidity is 50 NTU or less, and may not have more than 10% increase in turbidity when the natural turbidity is more than 50 NTU, not to exceed a maximum increase of 25 NTU."(AK Water Quality Standards (WQS) Tables, 2003)

Actual usages uses for these affected waterways are related to the growth and propagation of fisheries (Alaska Water Quality Standards 18 AAC 70.020(c), Table A, as amended, 2002), therefore a second criteria for turbidity important to the forest management is that samples

> " ... may not exceed 25 NTU above natural conditions. For all lake waters, may not exceed 5 NTU above natural conditions."

Turbidity protocols require sampling before construction, within 48 hours of the beginning of construction, and subsequent sampling as necessary. Grab samples and a portable turbidity meter were used in all cases. Some sites received pre-sampling background data gathering and some received post-impact sampling for several days after construction was completed.

Turbidity measured upstream of the drainage structure site was assumed to reflect natural or background conditions for evaluating the achievement of water quality criteria downstream of the drainage structure. The data collected is maintained in files on the Forest. For several sites numerous reading were collected although respective notes on construction were missing on some of the forms. Reviewing the data there are a few situations where the upstream reading is higher than the downstream readings. This suggests that the turbidity in the stream was affected by influences other than instream work at the site, or apparent data recording errors.

Site conditions play a substantial role in determining the nature of the turbidity readings. Stream discharge varies upon the bed load deposits, channel shape, stream size, and drainage area. For example, smaller streams sampled below road crossings that are located within alluvial geomorphologic areas are very dynamic and change rapidly. Peak flows at each site are dependent upon specific watershed characteristics such as size, number of lakes or ponds, and stream morphology. Turbidity is measured in nephelometric turbidity units (NTUs), and is both episodic and catastrophic. Turbidity increases occur in response to natural channel processes as well as forest management activities. Spikes in turbidity levels may be due in part to increased precipitation, level of flow, changes in watershed conditions or construction/ timber harvest. Measuring changes in turbidity with grab samples, only reflect the conditions of the stream at the time the sample was collected. Sampling at distinct times through grab samples does not provide the data necessary to predict longitudinal change.

Monitoring Results

Road construction or reconstruction increased on the Tongass National Forest in FY 2002 from 2001. Thirty-four new or replaced drainage structures were monitored in FY 2002 per criteria for turbidity monitoring protocol (Tongass National Forest Turbidity Monitoring Protocols, as revised, 2002). Diversion of water flow or "dewatering" from the immediate zone of construction, through cofferdams and diversion pipes, occurred in 2002 at several sites. These sites involved multiple phase construction of structures designed to provide fish passage. These structures were identified in the road condition survey process and prioritized for replacement.

Turbidity data were reported at five sites in the Upper Carroll Timber Sale, Revilladgigedo Island, one site on Kuiu Island, five sites on the Four Leaf Timber Sale and five sites in the South Lindy Timber Sale on Kupreanof Island, nine sites on Prince of Wales Island (POW) and nine sites on Mitkof Island. The tables, Turbidity Summary of Results 2002 that follow show listing of the sites monitored and tabulation of the results. A few sites (4 sites on Mitkof and 1 on POW) had only preconstruction data collected. This preconstruction data, although useful as a site indicator of background conditions, was not included in this data set.

Thirty-four locations, including 111 paired sampling episodes for turbidity (69 collected after the 48-hour temporal period), were monitored in FY 2002. These samples are a subset of the 290 total sampling episodes and 242-post construction sampling episodes. This is an expansion of the program from previous years. The data was summarized and evaluated in terms of periods of stream disturbance. The time of disturbance is measured from construction start of the initial disturbance till the turbidity ceases to be elevated then time measurement is restarted during each subsequent construction period at the onset of elevated turbidity again. The data collected in 2002 was collected per sample protocol in reference to construction start with notes on construction start and stop.

Turbidity measurement is relative to construction activity as well as stream bedload, channel type and flow. In some situations, turbidity was noted during construction in the temporal period of 48 hours after each construction phase. In a number of these sites, two to three distinct construction phases can be tracked. Detailed investigation of this data shows that inference can be made that only 4 sites actually exceeded the State water quality criteria on Four Leaf Timber Sale Road 6314 station 5+57, POW road 3030850 at MP 0.30, Mitkof Road 40000 MP 3.292, and Mitkof Road 6235 at MP 17.071. The episodes that were documented to exceed totaled 12 sampling episodes:

- 4 episodes on Four Leaf Timber Sale (4 samples exceeded 5 NTUs),
- 6 on Prince of Wales fish passage improvement sites (4 samples exceeded 5 NTUs and 2 additional sample exceeded 25 NTUs), and
- 2 episodes on Mitkof fish passage improvement sites (1 sample exceeded 5 NTUs and 1 additional sample exceeded 25 NTUs).

Refer to the summary tables that follow to identify these sites. In each of the cases where the water criteria was interpreted to not exceed, data shows that the water had cleared less than 48 hours prior to the second and third construction periods. The data shows that the water quality returned to less than 5 NTUs above natural levels most cases. In a couple instances, visual observations were used to document the turbidity levels returned to natural conditions.

Table 2-37. Turbidity Summary of Results 2002, Upper Carroll

Location and Milepost	Dates and total hours from construction start to last sample	Number of paired sampling episodes total	Paired samples with Recovery within 48 hours	Samples over 5 NTU difference after 48 hour construction period and under 25 NTU total*	Samples over 25 NTU difference total, after 48 hour construction period*	Comments
Upper Carroll 840000-2 St 77+08	6/13-6/14/ 48	1	1	0	0	
Upper Carroll 840000-2 St 91+63	6/29-7/1 48 hours	1	0	0	0	
Upper Carroll 840000-2 St 161 + 31	7/17-8/7 600 hours	2	0	0	0	1 pre-construction background sample
Upper Carroll 840000-3, St 2+03	7/7-7/10 101 est. 68 hours	1	0	0	0	
Upper Carroll 840000-3, ST161+41	8/26-8/30 121.5 hours	2	0	0	0	1 pre-construction background sample, intermittent construction

*Columns are mutually exclusive; no sites had background > 50 NTU

Table 2-38. Turbidity Summary of Results 2002, Kuiu Island

Location and Milepost	Dates and total hours from construction start to last sample	Number of paired sampling episodes total	Paired samples with Recovery within 48 hours	Samples over 5 NTU difference after 48 hour construction period and under 25 NTU total*	Samples over 25 NTU difference total, after 48 hour construction period*	Comments
Kuiu Island bridge 6415, MP 8	8/28-9/3, 101 hours	1	0	0	0	1 pre-construction background sample; 1 sample post construction sample not paired

*columns are mutually exclusive; no sites had background > 50 NTU

Table 2-39. Turbidity Summary of Results 2002, Kupreanof Island

Location and Milepost	Dates and total hours from construction start to last sample	Number of paired sampling episodes total	Paired samples with Recovery within 48 hours	Samples over 5 NTU difference after 48 hour construction period and under 25 NTU total*	Samples over 25 NTU difference total, after 48 hour construction period*	Comments
4 Leaf Kupreanof Island, 6314, St 100+42	6/10-7/17 576 hours	1	0	0	0	MIS Fish Site; pre-construction sample not paired
4 Leaf, 6314, ST 23+94	10/25-10/29, 85 hours	1	No paired post – construction samples	0	0	Infer upstream reading from background; likely met standards; total < 5 NTUs
4 Leaf, 6314, St 24+25	10/25-10/29, 63.5 hours	1	No paired post – construction samples	0	0	Infer upstream reading from background; likely met standards; total < 5 NTUs
4 Leaf, 6314, St 87+12	6/5-6/12, 145 hours	1	0	0	0	Pre-construction sample not paired
4 Leaf, 6314, St 5+ 57	7/26-8/2, 192 hours	8	1	4	0	Spike resulted ~48 hr after blasting; episode exceeding 25 NTU and one episode >5 NTU was during temporal period during construction

*columns are mutually exclusive; no sites had background > 50 NTU

Table 2-40. Turbidity Summary of Results 2002, Prince of Wales Island

Location and Milepost	Dates and total hours from construction start to last sample	Number of paired sampling episodes total	Paired samples with Recovery within 48 hours	Samples over 5 NTU difference after 48 hour construction period and under 25 NTU total*	Samples over 25 NTU difference total, after 48 hour construction period*	Comments
POW, 3030850, MP.48	8/23-9/1, 185 hours	6	0	0	0	No pre-construction pair, Paired samples begun 110 hours after construction; samples in 2nd construction set met within 48 hour period
POW, 3030850, MP .27	7/2-9/1, 1224 hours	2	1	0	0	1 sample upstream > downstream, prior to construction; beaver ponds; no samples after 48 hrs
POW, 2054300, MP .30	8/14-8/27, 320 hours	3	2	0	0	No samples after 48 hour period
POW, 3030850, MP .30	8/17-8/30, 326 hours	12	1	4	2 background high due to rd. runoff; > 25 NTU for <24 hour continual period; still exceeded 5 NTU total	2 samples upstream higher than downstream due to road runoff but continued to exceed
POW, 2054000, St 3.56	7/2-8/3, 748 hours	2	1	0	0	
POW, 3000000, MP 61.68	7/25-8/29, 93 hours	8	6	0	0	Fine substrate placed into culvert, 2nd construction <48 hour after
POW, 2054000, St 3.78	7/2-8/5, 794.5 hours	5	2	0	0	
POW, 2054000, MP2.22	7/2-8/1, 694.5 hours	8	3	0	0	1 unpaired sample would have exceeded; 2nd construction phase sample <48 hr after initial disturb.
POW, 2054300, MP 0.46	7/2-8/13, 957 hours	12	3	0	0	Both samples in 2nd construction phase, turbidity exceeded for a period of < than 18 hrs

*columns are mutually exclusive; no sites had background > 50 NTU

Table 2-41. Turbidity Summary of Results 2002, South Lindy

Location and Milepost	Dates and total hours from construction start to last sample	Number of paired sampling episodes total	Paired samples with recovery within 48 hours	Samples over 5 NTU difference after 48 hour construction period and under 25 NTU total*	Samples over 25 NTU difference total, after 48 hour construction period*	Comments
South Lindy, 6350, MP 4.7	8/9-8/10, 28 hours	2	1	0	0	Pond with water flowing over road
South Lindy, 6350, MP 4.6	8/7-8/10, 72 hours	2	0	0	0	Pond with water flowing over road
South Lindy, 43500, St 8+60	8/21, 4 hours	1	1	0	0	No pre-work paired samples done
South Lindy, 43500, St 43+00	9/6, 5 hours	1	1	0	0	No pre-work paired samples done
South Lindy, St 69+45	10/2, 8 hours	1	1	0	0	No pre-work paired samples done

*columns are mutually exclusive; no sites had background > 50 NTU

Table 2-42. Turbidity Summary of Results 2002, Mitkof Island

Location and Milepost	Dates and total hours from construction start to last sample	Number of paired sampling episodes total	Paired samples with recovery within 48 hours	Samples over 5 NTU difference after 48 hour construction period and under 25 NTU total*	Samples over 25 NTU difference total, after 48 hour construction period*	Comments
Mitkof Island, 40000, MP 2.492	7/11-7/17, 144 hours	5	1	0	0	1 exceeds 5 NTU, est. < 48 hour since no paired data
Mitkof, 40000, MP 3.337	7/17-7/27, 240 hours	10	1	0	0	1 exceed w/in 22 hours; 1 exceed w/ in 46 hr clear; 1 exceed w/ in 24 hour
Mitkof, 40000, MP 5.001	9/5-9/12, 168 hours	3	0	0	0	
Mitkof, 40000, MP 3.292	9/11-9/13, 72 hours	3	1	0	1	Fines placed in culvert, continue exceed from start
Mitkof, 40000, MP3.356	9/21-9/28, 168 hours	9	0	0	0	
Mitkof, 6235, MP 17.071	7/29-8/1, 96 hours	4	1	1	0	< 48 hour after no exceedances, 2nd construction period
Mitkof, 6235, MP 12.361	8/30-8/31, 48 hours	3	1	0	0	Dewatering corrective action; acceptable in <48 hour
Mitkof, 6235, MP 17.579		6	1	0	0	Beaver dam at inlet, caused backwater increase; all downstream readings< 5 NTU est. no exceedances; 2 incidence of exceedances on 3 sample sets; last duration unknown, 1st set ~ 48 hr @ 5NTU level
Mitkof, 6235, MP 15.846		6	2	0	0	Exceed during coffer dam construction

*columns are mutually exclusive; no sites had background > 50 NTU

Evaluation of Results

Turbidity readings are easily obtained, time sensitive indicators of water quality. Data collected potentially could contribute to site characterization for more extensive sampling. Turbidity data reported in FY 2002 demonstrates compliance with State water quality criteria. Although the time in which compliance was achieved varied less than 48 hours to over 100 hours after construction was completed.

Comparison of the data indicates at that sites where construction was completed during low flow periods, minimal precipitation episodes, minimal dewatering disturbance occurred; turbidity was within the water quality standards within the 48-hour temporal period. Those sites that were involved with extended construction periods and intermittent work stoppages, or that experienced increased flow due to rainfall and beaver dams or those streams that exhibited multiple construction locations along their reaches or were disturbed by dewatering tended to reflect these circumstances in turbidity peaks.

Corrective actions were necessary in seventeen of the locations as illustrated in thirty paired "exceeds" readings. Frequently, those locations showed spikes in turbidity with duration of less than 48 hours. This response indicates that the sediment in the system was very responsive to changes throughout construction. In several examples, degradation shifted with each sampling episode, suggesting that the influence mobilizing suspended sediment was changing. The number instances where upstream readings were higher than downstream suggests that multiple projects on the same stream system and external disturbances that are concurrent with the culvert replacement are influencing turbidity readings of the grab sample.

Comparing the dataset to the water quality criteria for growth and propagation of fish, the criteria was met at 33 of the 34 locations. Examining the data from reference to periods of exceedances that extend beyond the 48 temporal periods, one location shows episodes of turbidity that may have exceeded 25 NTUs. Follow-up measurements were not taken at Mitkof Road 40000 MP 3.292 site; therefore, this Mitkof site was still listed as potentially over 25 NTUs for more than 48 hours. The duration of the increased turbidity was not defined. At POW Road 2054300 MP 0.30, extended low-level turbidity was documented with numerous spikes related to construction activity. The water quality exceeded 25 NTUs for less than 13 hours at this POW site in one sampling episode and less than site 36 hours at a second sampling episode at the same site.

In several cases, water quality was exceeded with the implementation of the dewatering process. This probably was due to the soil disturbance required to create the cofferdam and re-channel the flow. The construction of the dewatered sites also takes expanded periods of time, which allows for many other potential factors like heavy precipitation events, road haul on roads within the watershed, and erosion from bared soil slopes at the site to potentially effect the turbidity sampling location. Mitigation measures for this construction included deploying straw tubes, straw, and silt fence at the sites in addition to construction of dewatering ponds where sediment could settle. These measures were incorporated into the contracts and employed at each site before exceeding the water quality standards. The application of these mitigations was modified and intensified in response to high turbidity readings as corrective measures to reduce turbidity.

Trends in Turbidity

Comparisons of past data sets is possible; however, differences in data collection and recordation over the last five years as well as construction make the comparison indirect. Data collected from 1999 through 2001 was not initiated until 48 hours after construction stopped. Duration of elevated turbidity from construction onset from these data sets is difficult to discern. Construction methods changed in 2001 to incorporate dewatering and multiphase construction of more complex structures. In 2002, more extensive construction occurred at some drainage structure locations and the construction period was changed from typically 24 hours to intermittent construction for 3 weeks. The turbidity sampling protocol has consistently required turbidity measurements at a minimum of 40 percent of culverts greater than 48" diameter and bridge sites.

This year a stream simulation designs were implemented in reconstruction of culverts to improve fish passage. This construction frequently involves dewatering the sites through diversion of the flow and extensive excavation. The stream gradients are constructed specifically to provide fish passage. The stream banks are reconstructed to near their original contours.

Beginning in 1999, turbidity was measured up and downstream of new or replaced drainage structure sites after instream work was completed. Although criteria specifying a percentage of sites monitored were implemented, an actual random or stratified site sampling strategy was not employed. Most sites were in the Petersburg, Wrangell, and Ketchikan-Misty Ranger Districts. A total of 32 sites have been monitored (3 in 1999, 28 in 2000, and 1 in 2001). In general, turbidity samples were collected approximately 48 hours after construction was complete, using grab samples. A portable turbidity meter (Hach 2100P) was used to obtain NTU readings.

Reviewing the sampling results, a few conclusions can be drawn. The three episodes on Wrangell Island in 1999, showed data where turbidity exceeded water quality standards in one case. In 2000 thirty-six episodes of sampling were completed. The Wrangell Island locations were not in compliance ten of the fourteen times, possibly due to increased fine sediments such as silts. In FY 2001 one location on Mitkof Island was sampled for three episodes. Few conclusions can be made from these readings except they did not exceed the water quality standards.

Table 2-43. Summary of Turbidity Results 1999 - 2001

Time following construction completion when turbidity met State Water quality criteria	Number of sites meeting State Water quality criteria	Comments
< 24 hours	5 sites	
< 48 hours	15 sites	Total 20 sites met turbidity water quality standards within 48 hours
< 50 hours	5 sites	Monitored during heavy precipitation or high stream flow; compliance achieved within 42- 48 hours
64-89 hours	4 sites	No data collection within 48 hours of completion; sites may have been in compliance prior to sample collection
186 hours	1 site	
No data	2 sites	Sites not monitored long enough to show if met turbidity criteria; one measurement taken 3 hours after construction completion showed 14 NTU at high flow; other site assumed to have met water quality standard 306 hours after completion

Of the total 32 sites monitored, only two sites had extended periods of turbidity measurements exceeding water quality criteria. These sites reflect construction and heavy truck haul under adverse weather conditions (12 inches of rain in 17 days) on poor quality rock. Numerous corrective actions were attempted and documented but were probably not effective until heavy precipitation ended.

In summary, the data from 1999-2001 shows 26 of 32 sites monitored show compliance with water quality criteria for turbidity within approximately two days of completion of instream work. Three additional sites monitored show compliance within three to four days after instream work was completed, and these may have been compliant earlier. Two sites do not have final measurements to demonstrate compliance; one of these was probably compliant the day following completion of instream work, the other was still not compliant 12 days after completion of instream work. One site had elevated turbidity readings for at least six days after completion.

A review of previous years' turbidity readings indicates sampling episodes were minimal. Looking at the data for trends or correlation, this data did not support the findings from the successive years. The sample sizes are much too small to draw any valid conclusions. Additional sites could have provided more reliable results relative to the range of projects and conditions encountered during drainage structure installation activities across the Forest.

Reviewing the results from 2002 show varied levels from turbidity measured relative to construction. The samples were not collected continually, so the turbidity levels monitored only provide indicators of the site. In some cases limited data was available in terms of turbidity readings and construction notes relative to construction starts and stops. In a few of these cases, construction starts had to be reconstructed from construction data and oral discussions with the contract inspectors. Evaluation of the field data results can be interpreted to show that 30 sites met the State water quality criteria for a period following the 48-hour temporal period following in stream work.

A summary of these results is shown in the Table 2-44.

Table 2-44. Summary of Turbidity Results 2002

Time following construction start / restart when turbidity met State water quality criteria	Number of sites meeting State Water quality criteria	Comments
<48 hours	30 sites	Some estimates since data on start/ stop of construction indistinct
49-96 hours	0 sites	
97-144 hours	1 site	Four Leaf TS Road 6314; station 5+57
145+ hours	1 site	POW Road 2054300 MP 0.30
No data	2 sites	Mitkof Road 6235 MP 17.071; Mitkof 40000 Road MP 3.292

The data collected show that under typical construction conditions, BMPs are probably effective in achieving water quality criteria for turbidity within a couple of days following completion of instream work. In some cases construction during heavy rains and high stream flows complied difficulties in meeting water quality criteria within two days of disturbance. However, where heavy rains occur in combination with poor rock quality, heavy truck haul, and or other adverse site conditions, corrective actions (in addition to routine BMP implementation) short of shut-down may not be effective in achieving water quality criteria. Sample collection at most sites from 1999 to 2001 did not occur early enough after initiation of instream work to credibly estimate the length of time turbidity was elevated. In 2002, it was recommended that turbidity data be collected within 48 hours of the initial instream disturbance and on a daily basis thereafter to better document the total time of elevated turbidity associated with drainage structure installation.

Construction at the sites in 2002 involved more starts and stops than construction had in prior years so some sites had numerous temporal periods. Comparing the 2002 results to the results from prior years, the change in construction periods probably accounts for fewer incidences where the water quality criterion was exceeded. The increase in construction starts and stops was due to modifications in constructions methods to involve dewatering and construction of complex structures involving baffles and in laid stream gravels, and contoured stream banks to develop sites that simulate the natural streams.

Recommendations

The following actions are recommended for turbidity protocols for 2002 and many were incorporated into the March 2003 revision:

1. Clarify turbidity protocol to emphasize sampling within 48 hours of construction onset and describe continued intervals of monitoring throughout construction. Define how to monitor situations of intermittent construction.
2. Employ a random selection strategy for at least a subset of in stream projects. This would improve the representative nature of the data and minimize potential bias associated with weather conditions or other logistical factors.
3. Continue to emphasize pre-season (early spring) contact with each district and the Supervisor's Office structures group to identify the pool of projects requiring turbidity monitoring. Ensure that personnel are available on-site for each project to collect samples according to the protocol.
4. Emphasize work with State of Alaska, ADEC on sampling sites where water quality criteria may be temporarily exceeded.
5. Rigorous adherence to sampling within 48-hour period at the onset of stream disturbance followed by sampling at intervals from the beginning of construction, through the construction end until the water quality has met the State water quality standards and no more disturbance is incurred. (IBID 2003).
6. Ensure data is collected in downstream and upstream in each sampling episode. In general, paired data collection is a necessity to monitor potential changes in time. Twelve turbidity-sampling instances were not paired and there was no way to determine if the turbidity readings reflected changes due to construction impacts. Timing of sample collection is critical to accurate monitoring and data analysis.

The following actions are recommended for turbidity monitoring in the future, providing staff and funding are available.

1. Adjusting sampling strategy to use random and/or stratified samples. Sampling may be stratified in various ways such as monitoring all culverts over 48", 60" streams or above, all Class I streams.
2. Increasing the intensity of monitoring through semi- permanent instruments run by battery power.
3. Assessing and recording the stage of the flow through gauged stations.
4. Determining the respective hydrograph readings (rising or falling limb changes compared to levels at base of flow).

The following actions are recommended for drainage structure construction in 2003.

a. Reduce the amount of fines and organic sediment placed within culverts. The more course material may contribute to reduce turbidity spikes after construction is completed.
b. Carefully track construction at adjacent sites. Ensure that the background upstream readings are not bias by influences of other construction
c. Ensure dewatering structures are placed appropriately to minimize sediment re-entry into the stream course and the passage of the water through a filtering mechanism, soil, and landform.
d. Trained personnel with responsibilities of sample collection and recordation are on site as well as personnel who have authority to implement corrective action measures.

Stream Temperature

Stream temperature data were again collected at sites across the Tongass National Forest in FY2002. About twenty stream temperature-monitoring sites were established on Prince of Wales Island to document temperature trends in various stream reaches and relate them to fish kills, should they recur. The majority of these streams are located in relatively large, harvested watersheds with historical fish kills. A few are located in relatively large un-harvested watersheds for reference purposes. None of the monitored Prince of Wales Island streams represent management solely under current Forest Plan standards and guidelines (e.g., they include extensively harvested riparian areas). Stream temperature data are also collected at two sites in the Ketchikan-Misty Ranger District for project monitoring purposes. This year Ketchikan-Misty Ranger District personnel began collecting continuous stream temperature data in the resident fish Management Indicator Species monitoring reaches in the district.

An analysis of 2002 data is underway as part of an ongoing effort to evaluate long-term trends in stream temperature on Prince of Wales Island. Until this effort is complete, and unless relevance to current Forest Plan standards and guidelines can be established, stream temperature data will not be independently reported as annual results of Forest Plan effectiveness monitoring. These data and summary information may be obtained from Tongass National Forest Fisheries or Watershed program staff.

Alaska Department of Fish and Game or Forest Service personnel reported no fish kills in the Tongass National Forest in 2002. Fish kills were reported in Staney Creek and Thorne River in August 2001. These fish kills corresponded with low streamflow and high air temperature events in these watersheds. Low streamflow did not coincide with pink salmon returns on Prince of Wales Island in 2002.

Evaluation of Results

Evaluation of the 2002 data in the context of the long-term dataset of stream temperatures, climate, and watershed and riparian variables on Prince of Wales Island is currently underway. This information will be available as requested from Tongass National Forest Fisheries or Watershed program staff.

At this time, there is insufficient information to evaluate the effectiveness of BMPs in attaining state water quality criteria for stream temperature in the Tongass National Forest. The stream temperature monitoring sites were selected on the basis of historic fish kills, and are not representative of current Forest Plan standards and guidelines. Past reports show that stream temperatures sometimes exceed state water quality criteria in un-harvested as well as harvested watersheds. Maximum stream temperatures are probably more closely related to climate influence than implementation or effectiveness of current Forest Plan standards and guidelines. A recent examination of the Staney Creek streamflow record indicates decadal climatic cycles have a significant influence on the frequency and duration of low-flow events (Neal 2000). This finding highlights the need for long-term data to evaluate the influence of forest management on streamflow as well as stream temperature in Southeast Alaska. Hyporheic processes and riparian stand conditions (deciduous versus coniferous) also play significant roles in moderating stream temperatures.

It is reasonable to assume that shade and cover associated with intact riparian vegetation throughout stream networks (maintained through no-harvest buffers required under the current Forest Plan) will maintain a natural range of variability in stream temperatures. It is also reasonable to assume that in Southeast Alaska, summer stream temperatures will rise in all watersheds, especially those with lakes, during periods of little or no rainfall.

Recommendations

We recommend no corrective action with respect to maintaining stream temperatures necessary for protecting beneficial uses in the Tongass National Forest at this time. It is reasonable to assume that the current riparian standards and guidelines maintain the riparian processes associated with moderating stream temperatures beneficial to aquatic life.

We recommend continued focus on the implementation of riparian buffers and their stability or windfirmness over time as a higher priority for Forest Plan monitoring. In addition, we recommend that stream temperature alone not be reported as effectiveness monitoring results pending further evaluation. Since we may be unable to explicitly link stream temperature data to current BMPs, this approach is more defensible and more consistent with the monitoring and feedback strategy approved by the regulatory agencies. There is strong evidence that the maintenance of intact riparian forest is a primary mechanism for moderating stream temperatures. There is also strong evidence to suggest that rainfall itself has a moderating influence. Forest Plan activities do not alter climate and other important temperature-moderating mechanisms. However, if stream buffers are not implemented as planned, or if they subsequently blow down, stream temperatures may be affected as a result. Therefore, it is a more efficient use of time and funds to monitor the buffers and provide immediate feedback to managers regarding their implementation and effectiveness.

The Forest Plan does not require stream temperature monitoring in and of itself as a method for evaluating the effectiveness of BMPs. Stream temperature data must be interpreted in concert with climate, streamflow, riparian, and watershed data over the long-term. Understanding stream temperature regimes is essential to cumulative effects analysis, continued management, and restoration of previously harvested watersheds. We do recommend that stream temperature data collection continue in a more strategic effort in conjunction with other monitoring efforts in specific watersheds (e.g. case study watersheds and resident fish or coho MIS watersheds, etc).

Recommendations for improving the utility of the stream temperature data collected in the Tongass National Forest were included in the 2000 and 2001 Annual Monitoring and Evaluation Reports. To a large extent, these recommendations have not been addressed. The evaluation of the Prince of Wales Island data underway will contribute to the development of a more strategic use of stream temperature in the context of monitoring at the Forest Plan or project scale.

Visual Observation of Water Quality Degradation

Observing and documenting water quality degradation during resource management activities is a Forest Service responsibility in the 1992 Memorandum of Agreement between the Forest Service and ADEC. Forest Service employees who have field inspection and/or administration responsibilities document and immediately report visual observations of water quality degradation. Forest Service personnel reported no water quality degradation during resource management activities in 2002.

SUBSISTENCE

Goal: Provide for, "...the continuation of the opportunity for subsistence uses by rural residents of Alaska..." (Public Law 96-487—DEC. 2, 1980, Sec.801)

Objectives: To evaluate and consider the needs of subsistence users in making project land management decisions.

Implement the subsistence monitoring report template that was developed last fiscal year. The template was designed to organize and display monitoring information in order to facilitate an in-depth description of the effects of management activities on subsistence users.

Background: The Alaska National Interest Lands Conservation Act (ANILCA, 1980) requires a priority for subsistence uses by rural residents on Federal public land in Alaska (Title VIII). Since 1990, the Federal Government has been managing resources for subsistence use on Federal public lands through the Federal Subsistence Board.

Several pieces of legislation and sets of regulations provide the framework of our legal responsibilities. These are:

- Title VIII of ANILCA;
- Federal Subsistence Management Regulations (36 CFR 242 or 50 CFR 100);
- Federal Advisory Committee Act (FACA); and
- Federal Advisory Committee Management Regulations (41 CFR 101-6).

Current Situation: In 1995, the Ninth Circuit Court of Appeals ruled that the existing scope of the subsistence program should be expanded to include"...those navigable waters in which the United States has an interest by the virtue of the reserved water rights doctrine." Subsistence management of these waters became effective in October 1999.

To date, this new responsibility has resulted in the development of investigative projects designed to evaluate the condition of fish stocks important to subsistence fisheries, gather and evaluate Traditional Ecological Knowledge (TEK) in several key subsistence areas, and evaluate the consistency of the various existing fish harvest regulations. In addition to working through another annual cycle of wildlife regulation proposals, subsistence fishing regulation proposals are evaluated and presented to the Southeast Regional Advisory Council.

Subsistence Question: Are the effects of management activities on subsistence users in rural Southeast Alaska communities consistent with those estimates in the Forest Plan?

Monitoring Results

The known effects of management activities on subsistence users (rural residents as defined in ANILCA) have not been determined to be inconsistent with the Forest Plan.

Many of the monitoring projects are long term in nature, and conclusions will not be available for several more years.

These fisheries monitoring project include the following:

- Klawock Lake Sockeye Stock Assessment;
- Falls Lake Sockeye Stock Assessment;
- Klag Bay Sockeye Salmon Stock Assessment;
- Hetta Lake Sockeye Stock Assessment;
- Salmon Lake Sockeye and Coho Stock Assessment;
- Virginia Lake Sockeye Assessment;
- Gut, Kook, and Hoktaheen Lake Sockeye Esc. Index;

- Thoms, Salmon Bay, Luck Lake Sockeye Esc. Index;
- Neva, Pavlof Sockeye Stock Assessment;
- Redfish Bay, Tumakoff Sockeye Stock Assessment;
- Eek Lake Sockeye Salmon Stock Assessment;
- Kanalku, Hasselborg, and Sitkoh Lake Sockeye Esc. Index.

In addition to the above, there are wildlife projects in progress, such as a deer-wolf study, the Yakutat moose study, and deer pellet transects.

The Traditional Ecological Knowledge (TEK) monitoring projects include the following studies:

Documentation of Subsistence Use Patterns

- Southeast Alaska Subsistence Fisheries Database Development
- Traditional Subsistence Territory Mapping of SE Tribes
- Continuing Management and Development of the SE Subsistence Fisheries GIS database
- Kake Subsistence Sockeye Salmon Harvest Use Pattern
- Prince of Wales Island Steelhead/Rainbow Harvest Use Patterns
- East Alsek River Salmon Historical Use and TEK
- SE Subsistence Fisheries GIS Database Development
- Wrangell Subsistence Salmon Harvest Use Pattern
- Hoonah and Klawock Salmon Survey
- Klawock River and Sarkar Lake Sockeye Salmon Harvest Use Patterns

The following is the Subsistence Monitoring Report template that has been designed to organize and display monitoring information in order to facilitate an in-depth description of the effects of management activities on subsistence users.

1. NEPA Scoping – Subsistence portions

There were approximately 36 NEPA actions signed or ready to sign in 2002. This information was gathered from the quarterly updated Schedule of Proposed Activities (SOPA). The NEPA actions include Environmental Analysis (EA), Environmental Impact Statements (EIS), Categorical Exclusion decisions (CE), and Supplemental EISs (SEIS). These projects ranged in complexity from EIS on major timber sales to decision memos for small scale special use permits. Most of the NEPA actions were not timber related.

2. Communications with community leaders regarding subsistence issues.

Currently we have no standardized way of keeping track of communications with community leaders and Federally recognized Tribes concerning subsistence matters. Because of this, it is sometimes difficult to differentiate between contacts made with community leaders and recognized Tribes.

3. Consultations with federally recognized Tribes regarding subsistence issues.

Consultations with Tribes and communications with community leaders took place in many forms. These included informational meetings, formal public open houses, formal 810 subsistence hearings, national Roadless Area meetings, Fish and Game Advisory Board meetings, other organized group board meetings, and teleconferences. The Forest Service is in almost continuous contact with the recognized tribes.

4. Efforts to capture traditional environmental knowledge such as Dog Point Camp.

As mentioned previously, there are at least ten (10) studies and documentations of subsistence use patterns. These are designed to determine the amounts and patterns of subsistence use.

5. Comments from Native and non-Native groups regarding subsistence issues.

Issues that were brought out during scoping efforts include maintaining road access to subsistence resources, concern over population health of fish and wildlife stocks, and competition for natural resources between rural and non-rural harvesters.

Timber Management

Timber Management Question 1: Are timber harvest activities adhering to applicable timber management standards and guidelines?

Goal: Maintain and protect multiple use values and resources in harvest areas.

Objective: Determine whether standards and guidelines are being followed in harvest areas.

Monitoring Question: Are timber harvest activities adhering to applicable timber management standards and guidelines?

Timber Management Question 1 addresses the limitation of created openings greater than 100 acres and the 1,000-foot beach and estuary buffer requirement. All harvest unit locations are entered in the Forest's geographic information system (GIS). These units are compared to the 1,000-foot beach and estuary buffers to determine if they infringe on the buffer zones. In addition, unit size is tracked (see Timber Management Question 6).

Refer to the Fish Habitat, Karst and Caves, Soil and Water, Wetlands, and Transportation sections in this report for a discussion of harvest as related to standards and guidelines for those resources.

Monitoring Results

There were 1,225 acres fully or partially harvested during FY 2002. Of these, 844 acres resulted in the creation of an opening. Four hundred ninety three acres, the majority of the harvests that created an opening were sold under the 1997 Forest Plan. The 100-acre size limitation applies to all harvest units that create an opening. No openings exceeded 100 acres in size.

There were three stands harvested during FY 2002 that fell within the 1,000-foot beach and estuary zone. Two of these, which lie entirely within the beach zone, are located on Zarembo Island, Wrangell Ranger District. These two units were harvested via a salvage cut. Only blowdown trees within the beach fringe in the Scenic Viewshed Land Use Designation (LUD) were removed. No standing dead or standing green trees were harvested. The salvage harvest was authorized by the decision memo for the Deer Run Salvage Timber Sale EA signed in May 2000 and is consistent with land use designation prescriptions.

The third FY2002 harvest unit lies approximately 800 feet from the beach within the Ketchikan Misty Ranger District in Carroll Inlet. The unit is located in a Modified Landscape LUD and was authorized under the Upper Carroll Inlet EIS, a 1997 Forest Plan Record of Decision Category 2 sale signed in October 1996.

Of the total acres that created harvest openings created in fiscal year 1998-2002 period, only four units exceeded the 100acre limit. All four were analyzed and approved in project-level Records of Decision.

In fiscal year 1999, there were 17 category 1 and 2 units partially or completely within the 1,000 ft. zone, 18 category 1 units in fiscal year 2000 and 3 units in fiscal year 2002. There were no units within the 1,000 ft. zone in fiscal years 1998 and 2001.

Evaluation of Results

No action is needed. The timber harvest activities discussed above are adhering to applicable timber management standards and guidelines.

Timber Management Question 2: Are harvested forested lands restocked within five years following harvest?

Goal: Forest productivity is to be maintained in all harvest areas. Monitor the restocking of all lands that have received a regeneration harvest and determine if restocking has occurred within five years of final harvest.

Objective: Areas not adequately restocked with desirable tree cover within a five-year time frame are to be identified and action taken to see that failed areas are reforested. Changes in silvicultural practices may be necessary in these areas.

Background: Obtaining regeneration that meets the stocking guidelines and certification standards identified in the Silvicultural Practices Handbook (FSH 2409.17) is rarely a problem on stands receiving a regeneration harvest on the Tongass National Forest. Unpublished research and field observations indicate there are specific site conditions and opportunities that may indicate a need for artificial regeneration (this is usually planting and only rarely artificial seeding). Some situations to be particularly aware of are as follows:

- cutover, open canopy, or sparsely stocked sites with an established ground cover of dense vegetation such as salmonberry, devils club, or grass;
- sites lacking a satisfactory seed source within approximately 660 feet from the center of the cutting unit;
- sites with lower productivity that presently have a plurality of cedar and in which there is a desire to retain a cedar component in the stand;
- stand compositions where change is needed, such as stands planned for harvest or already harvested where the adjacent seed source contains a high incidence of fluted hemlock;
- artificial regeneration is rarely needed and is prescribed on less than 5 percent of the harvested acres; and
- stands needing reforestation for other considerations, such as visually sensitive areas in which immediate regeneration through artificial reforestation would lessen the visual impact; or using genetically improved stock to increase the genetic makeup of the treated stand.

All harvested lands are examined following treatment. Artificially seeded or planted areas are examined one and three years after treatment. Examination occurs three growing seasons after treatment in areas where it is anticipated that natural regeneration will be adequate. Stands are certified as stocked if the third growing season survey indicates that the areas meet stocking standards. Artificial regeneration is prescribed if the third-year survey indicates that natural regeneration is highly unlikely. A silviculturist recommends Regeneration Certification for every unit harvested that meets or exceeds the stocking guidelines in the Silvicultural Practices Handbook - FSH 2409.17. Certification records are reported through the District Ranger to the Forest Supervisor. Certification records are kept in stand files at the ranger districts and in the Silvicultural Information System (SIS), an electronic database.

During FY 2002, 3,347 acres were examined to determine the condition of the regeneration in harvest areas. Based on SIS data, timber harvest that occurred in FY 1996 and FY 1997 was evaluated, as displayed in Table 2-18 and 2-19. All lands harvested before 1996 are re-stocked.

Monitoring Results

1996 Harvests

All stands harvested in 1996 were certified as restocked with the exception of one stand on the Craig Bay Ranger District. This two-acre stand (tm_compartment 62007 stand 526) was planted in 2001. The stand was surveyed in FY2002 and survival of planted seedling was 90%. A final field survey is planned in 2004. We expect the results of the survey will allow the stand to be certified as regenerated.

Of the 14,336 acres of regeneration harvests that occurred between the start of fiscal year 1993 and the end of fiscal year 1997, all acres are certified as regenerated with the exception of the two acres of fiscal year 1996 harvest discussed in the above paragraph.

Table 2-45. Status of Reforestation After Final Harvest FY 1996

Tongass Unit	Final Harvest Reported in FY 1996	Adequately Stocked Acres	% Adequately Stocked Acres	Acres Not Adequately Stocked	% Not Adequately Stocked
Petersburg RD	91	91	100	0	0
Wrangell RD	579	579	100	0	9
Sitka RD	431	431	100	0	0
Hoonah RD	14	14	100	0	0
Craig RD	341	339	99	2	1
Ketchikan-Misty RD	2371	2371	100	0	0
Thorne Bay RD	723	723	100	0	0
Total	**4550**	**4548**	**>99**	**2**	**<1**

Table 2-46. Status of Reforestation After Final Harvest FY 1997

Tongass Unit	Final Harvest Reported in FY 1997	Adequately Stocked Acres	% Adequately Stocked Acres	Acres Not Adequately Stocked	% Not Adequately Stocked
Petersburg RD	170	170	100	0	0
Wrangell RD	441	441	100	0	0
Sitka RD	301	301	100	0	0
Hoonah RD	41	41	100	0	0
Craig RD	105	105	100	0	0
Ketchikan-Misty RD	503	503	100	0	0
Thorne Bay RD	1436	1436	100	0	0
Total	**2997**	**2997**	**100**	**0**	**0**

Evaluation of Results

The results show that less than 1 percent or 2 acres of forestland harvested in 1996 were not adequately restocked within five years. The two acres are on the Craig District in one stand. This stand was planted during 2001 and will be surveyed in 2002 and again in 2004. We expect that the stand will be certified as regenerated upon completion of the 2004 field survey. All other acres harvested during the fiscal year 1993 through 1997 period are certified as restocked.

Timber Management Question 3: Is the Allowable Sale Quantity (ASQ) consistent with resource information and programmed harvest?

The Forest Plan developed an allowable sale quantity as part of the purpose and need of the document as required by the Forest and Rangeland Resources Planning Act. There are a little over 5 million acres of productive old-growth (POG) trees on the Forest. About 90% of the existing POG is protected and unavailable for timber harvest. About 7% of the POG that existed in 1954 has been harvested. The Forest Plan identified 676,000 acres of available timberlands for harvest over the rotation. The computer model FORPLAN was used in the Forest Plan to determine the volume that could be harvested per decade from the Forest given numerous constraints. The constraints modeled in FORPLAN included (but not limited to) adherence to the Forest Plan standards and guidelines, land use designations, and policy constraints such as sustained yield, non-declining even-flow of wood, culmination of mean annual increment and dispersion of harvest units all of which influences amount, timing and intensity of timber harvest. This monitoring question involves examining the amount of harvest compared to the ASQ level modeled in the Forest Plan.

Other monitoring questions scrutinize the implementation and effectiveness monitoring of the resource standards and guidelines, this question will assume the effects modeled in the Forest Plan are valid and compare the amount of sold and harvested timber to the output of the FORPLAN model ASQ determination. The Tongass National Forest was managed under the May 1997 Forest Plan ROD during fiscal years 1998 and 1999. The 1997-ROD set the ASQ at 267 million board feet (MMBF) per year. The April 1999 Modified Forest Plan ROD revised the ASQ to 187 MMBF per year. Implementation language contained in the 1999 ROD directed transition to the lower ASQ figure to begin October 1,1999, the start of FY 2000 (Forest Plan ROD, April 1999, Section VII. Implementation section, pages 63-64).

During continued litigation of the 1997 Forest Plan decision, Judge James K. Singleton of the United States District Court for the District of Alaska issued a ruling on March 30, 2001 that vacated the 1999 Modified Forest Plan Record of Decision (this ruling has been appealed and is pending a decision in the 9th Circuit Court of Appeals). The Alaska Court ruling returned the Tongass National Forest to the 1997 Forest Plan decision and, as stated above, set the Forest ASQ at 267 MMBF per year. The court-issued order was effective immediately. Fiscal year 2000 was the only year the 1999 Forest Plan ROD ASQ of 187 MMBF/year was in effect.

The ASQ is an upper ceiling governing the amount of timber that may be sold over a decade. The amount of sold timber may vary year to year but must not exceed the decadal ceiling. Timber is considered sold when the contract is awarded to the high bidder. Table 2-55 displays the amount of timber sold during fiscal years 1997 through 2002, and compares the total to the average annual amount of the ASQ.

Table 2-47. Tongass National Forest Timber Sold By Fiscal Year

Fiscal Year	Timber Volume Sold (Percent of ASQ)	Average Annual ASQ (1997 and 1999 Forest Plan ROD)
1997	214 MMBF (80% of ASQ)	267 MMBF
1998	24 MMBF (9% of ASQ)	267 MMBF
1999	61 MMBF* (23% of ASQ)	267 MMBF
2000	170 MMBF** (91% of ASQ)	187 MMBF***
2001	50 MMBF (19% of ASQ)	267 MMBF****
2002	24 MMBF (9% of ASQ)	267 MMBF
6 year average (Since 1997 Forest Plan Revision)	**90.5 MMBF (34% of ASQ)**	**267 MMBF**

* This figure does not include timber sales that were advertised and had bid openings in FY 1999 but were awarded in FY 2000.
** This figure includes sales advertised and had bid openings in FY 1999 but were awarded in FY 2000. This was due to financial review of a purchaser before timber sale award.
*** Note the change in ASQ due to the transition and implementation of the Record of Decision for the 1999 Modified Forest Plan.
**** Note the change back to the 1997 ASQ level as per the ruling in Sierra Club et al. v. James Lyons et al., March 30, 2001.

The measure of the ASQ is the timber volume sold, not the amount advertised or harvested per year. Timber sales sold during one year are typically harvested over several years. Included in Table 2-48 are harvest totals for the Tongass National Forest for fiscal years 1990 through 2002 for comparison purposes only.

Table 2-48. Tongass National Forest Timber Harvest By Fiscal Year

Fiscal Year	Harvest Total (Million Board Feet)	Forest Plan Allowable Sale Quantity	Percent of ASQ Harvested*
1990	471	450	1.05
1991	363	450	81
1992	370	450	82
1993	325	450	72
1994	276	450	61
1995	221	450	49
1996	120	450	27
1997	107	267	40
1998	120	267	45
1999	146	267	55
2000	147	187	79
2001	48	267	18
2002	34	267	13
6 Year Average (since 1997 Forest Plan Revision)	**100.3 MMBF**	**267**	**37 %**

*Shown for illustrative purposes only; the measure of the ASQ is based on timber harvest volume "sold" on a decadal average basis.

An injunction was issued in the 1997 Forest Plan litigation of *Sierra Club et al. v. James R. Lyons et al.* on March 30, 2001 that halted all logging activities that would change the wilderness character of any roadless lands. The Forest Service completed a Supplemental Environmental Impact Statement in 2003, which assessed the wilderness characteristics and met Judge Singleton's requirements. The Forest Service planned to offer 146 MMBF in fiscal year 2002. A significant portion of the planned timber offer is located in roadless areas and cannot be offered or sold. The impacts of the Singleton decision, the depressed timber market and Alaska's high logging costs are affecting the Forest Service's ability to sell timber sales.

In a separate decision on the 2001 Roadless Rule litigation, the Ninth United States Circuit Court of Appeals reversed Idaho Judge Lodge's injunction to prohibit the implementation of the Roadless Rule. The Ninth Circuit Court reinstated the prohibition of timber harvest and/or road construction in inventoried roadless areas. This ruling has a significant effect on current and future sale offer opportunities.

In FY 2002, a total of 70.3 MMBF was offered from 69 sales and permits. Of this total, 57.5 MMBF was offered from the fiscal year 2002 program. The remaining 12.8 MMBF was re-offered from previous years program. Of the 70.3 MMBF offered, 12 sales totaling approximately 24 MMBF were offered and received no bids.

There are several factors influencing the amount of timber sold and harvested including the ASQ, appeals, litigation, timber market, and timber sale value. The Forest Service has no control over appeals, litigation and the timber market. The Forest Service estimates demand each year and plans the timber offer level accordingly. The timber market and timber value offered by the Forest Service are significant factors in selling timber sales. The timber tables display that current timber harvest and timber sold levels are not at or near the 1997 and/or the 1999 Forest Plan ASQ ceilings (Tables 2-18 and 2-19). The effects of timber harvest are below the amount analyzed in the 1997 Forest Plan FEIS and/or the 1999 Forest Plan Record of Decisions. Due to litigation and court orders the Forest is offering timber for sale at a level substantially below that analyzed and permitted under the Forest Plan ASQ calculation and planned programmed harvest. However, with implementation of land use designation prescriptions, Forest Plan standards and guidelines, and Best Management Practices, the ASQ is consistent with resource information.

Evaluation of Results

No action is necessary at this time. Recommendations follow to continue to monitor.

Timber Management Question 4: Are the Non-Interchangeable Components (NIC) of the allowable sale quantity (ASQ) consistent with actual harvest?

The ASQ consists of two separate non-interchangeable components (NIC), also referred to as economic components. Under the 1997 Forest Plan, the ASQ is divided into NIC I (set at 2.2 billion board feet of timber per decade) and NIC II (set at .47 billion board feet per decade). The economic components of the ASQ equate to an average of 220 million board feet (MMBF) NIC I and 47 MMBF NIC II per year for an average annual total of 267 MMBF/year.

The Forest Plan sets the proportional mix of timber harvest volume for the NIC I and NIC II categories. The proportional mix in the Forest Plan is set at approximately 80 percent NIC I and 20 percent NIC II (Forest Plan ROD, pg 8). This represents a higher reliance on the NIC II component than that found in the 1979 TLMP.

The purpose of partitioning the ASQ into two separate components is to maintain the economic sustainability of the timber resource by preventing over-harvest of the most economic timber stands. The partitioning of the ASQ also serves to identify that portion of the timber supply that is at risk of attainment because of marginal economic conditions. The NIC I component includes land that can be harvested using "normal operability" logging systems (normal operability being defined as standard logging systems such as shovel and short span cable). The NIC II component includes land with high logging costs that are typically economically or technologically marginal. The NIC II component includes difficult and isolated operable timber stands requiring special logging equipment requirements due to yarding distances or topography (such as the use of long-span cable, helicopter or multi-span cable).

Theoretically, the NIC II component of the ASQ would only be offered for sale after the NIC I component had been satisfied. The sale of timber from NIC II lands would most likely be offered when the commodity market for timber is relatively high and the higher operational costs could be covered by the wood fiber value. Realistically, this is not the case and the Forest Service consistently offers some portion of NIC II with the total timber sale package. There are a variety of reasons for the inclusion of NIC II lands in timber sales including silvicultural treatments, economics of mobilization and the development of alternatives in environmental assessments that address public issues.

Unless the offer volume is at or near the 220 MMBF level (that portion of NIC I of the ASQ) the NIC II offer is not an issue since over-harvest of the "normal operability" is not possible.

Monitoring Results

All timber sale harvest units that were completed during FY 2002 were categorized into non-interchangeable components (NIC). Total timber volume harvested on the Tongass in FY 2002 was approximately 34 million board feet.

Table 2-49. Comparison of NIC I and NIC II Harvest By Fiscal Year and Percent of Total Harvest

Fiscal Year	NIC I Percent of Harvest	NIC II Percent of Harvest
1997*	No Data Collected	No Data Collected
1998	95 % (estimated)	5 % (estimated)
1999	88 %	12 %
2000	77 %	23 %
2001	46 %	54 %
2002	90%	10%

*The 1997 Forest Plan Monitoring and Evaluation Report did not analyze the NIC I and NIC II timber harvest categories.

The Forest Plan ROD states that the ratio of the NIC I and NIC II mix is approximately 80 percent NIC I and 20 percent NIC II (Final EIS, Table 3-81, page 3-282; and 1997 ROD page 8). The mix of NIC I and NIC II for FY 2002 as displayed in Table 2-19 is 90 percent NIC I and 10 percent NIC II.

All completed harvest units were analyzed in GIS using the operability layer to obtain the Forest Plan non-interchangeable component data (NIC Forest Plan calls). The operability layers within Forest Plan calls were then tabulated by timber sale, harvest unit and operability factors. The NIC Forest Plan calls were then compared to actual timber sale harvest unit map to determine yarding distances. For fiscal year 2002 harvest units, Forest Plan estimated the NIC I proportion of harvest to be 66% and NIC II to be 34%. In actuality, the NIC I proportion was 90% and NIC II 10% by acres. In general, it appears the Forest Plan underestimated road construction opportunities. It appears, from this year's data, that more roads were constructed to access timber sales than assumed possible by the Forest Plan.

Timber harvest on the Kuakan Timber Sale located on Deer Island represents 54 percent of all helicopter and approximately 27 percent of all uneven-aged management silviculture prescription harvest on the Tongass National Forest for FY 2002. Timber falling on the Kuakan sale began just prior to the March 30, 2001 Judge Singleton logging injunction. Timber felling operations resumed and harvest operations began shortly after the injunction was lifted on a few selected timber sales in May 2001. Harvest operations on the Kuakan timber sale continued into the fall and were completed early in fiscal year 2002 (November 2001) Although timber market conditions were low during this period, the timber sale was operated for its high quality wood content, invested mobilization costs (camp barge, helicopter and support equipment) and to meet the needs of the purchaser's milling operations. The Forest Plan operability calls were very close to the actual implementation operability. There may be a question of economic operability with the Kuakan sale since even though the operability calls are very good the fact that uneven-aged management and helicopter harvest system was used is very costly. In this case, the high value of the timber offset the high harvest cost but it is debatable if the Forest Plan NIC category should be changed due to management decisions that have a pronounced effect on economics? For example, should helicopter harvest less than three-quarters of a mile from the landing be considered NIC I when for instance more than 70% of the trees are retained, substantially increasing harvest costs?

The NIC monitoring results for FY 2002 may be an anomaly, and misrepresent the actual proportion of NIC I and NIC II harvest in a more lucrative timber market with larger quantities of timber harvested. Timber purchasers may have focused on more lucrative timber sales and those sales with more NIC I lands.

NIC data have been monitored for four years (and estimated one year). An apparent upward trend was occurring in the proportion of the NIC II harvest component from 1999 through 2001. Fiscal year 2002 may show a reversed swing in the NIC trend. The actual increase is not certain due to the relatively small data population set, low timber market and purchaser harvest choices.

Tables 2-50 and 2-51 display the amount and percentage of silvicultural systems post-1997 Forest Plan decision and for FY 2002. This information is presented to observe the trend in silviculture systems that may influence timber sale economic conditions. Harvest operation costs increase as the amount of residual trees (for example, uneven-aged and two-aged) is increased. Harvest production costs increase due to increase costs for harvesting equipment and operations (such as helicopter and multi-drum yarders, and increased number of cable corridor changes) that are capable of extracting logs in non-clearcut operations.

Table 2-50. Timber Harvest by Silvicultural System for Fiscal Year 2001 and 2002

Description	Silvicultural System	2002 Acres	2002 Percent	2001 Acres	2001 Percent
Clearcut	Even-aged	844	69	930	46
Selection	Uneven-aged	372	30	863	42
Two-aged	Two-aged	0	0	157	8
Salvage	Intermediate	9	1	76	4
Total		**1,225**		**2,026**	

Table 2-51. Timber Harvest by Silvicultural System Under the 1997 ROD (FY 1997-2002)

Description	Silvicultural System	Acres	Percent
Clearcut	Even-aged	15,622	80
Selection	Uneven-aged	2,691	14
Two-aged	Two-aged	883	4
Salvage	Intermediate	370	2
Total		**19,566**	

The silvicultural systems other than even-aged clearcutting are prescribed for objectives other than timber production, such as meeting visual quality objectives, leaving structure for wildlife and public issues. The tables above are listed to display the trends in silvicultural systems. Several broad categories have been formed to estimate use of different silviculture systems being implemented. Uneven-aged management is a rough indicator of the helicopter logging system category. Cable logging systems are not capable of maintaining randomly distributed trees in the harvest unit unless corridors are used for yarding. There are several reasons why the NIC II component could be trending upward:

- The increased use of helicopter logging to access unstable soil/steep topographic areas inaccessible and/or economically infeasible for road construction;
- The increased use of helicopter logging to meet scenic quality objectives; and
- The increased use of helicopter logging to meet the general objective of using less clearcut timber harvest prescriptions.

It is uncertain at this time that the non-interchangeable components of the allowable sale quantity are inconsistent with actual harvest. The uncertainty is due in part to the limited number of years of data and the anomaly of FY 2001 given the Forest Plan litigation and court ordered injunction.

Evaluation of Results

No action is necessary at this time. Recommendations follow to continue to monitor the trend of harvest from NIC II lands.

Timber Management Question 5: Is the proportional mix of volume in NIC I and NIC II accurate, as estimated in the Forest Plan?

The 1997 Forest Plan set the ASQ ceiling at 2.67 billion board feet per decade, equivalent to an annual average of 267 million board feet per year. The two separate components were proportioned at 2.2 billion board feet of NIC I and 0.47 billion board feet of NIC II per decade or 220 MMBF NIC I and 47 MMBF of NIC II per year.

The non-interchangeable components (NIC) are based on logging operability. Operability refers to the operating attributes and characteristics of a logging system. Operability is used to determine the logging systems requirements necessary to harvest different areas of suitable timberlands. Logging systems are selected based on resource protection needs, access limitations, and economics. The information used in the Forest Plan to estimate and set the proportional mix of components was derived from the forest logging operability inventory. All normal operability lands provide the NIC I portion of the ASQ, and the difficult and isolated lands make up the NIC II portion. NIC I operability refers to economics of logging systems and suitable timberland geography that have normally been accessed on the Forest (such as close distances to a road and logging systems such as tractor, cable). NIC II operability refers to those logging systems and that geography that have not been commonly used or harvested (such as areas referred to as difficult, or isolated to harvest and those systems such as long-span cable and helicopter with high economic costs).

Monitoring Results

The non-interchangeable components (NIC I and NIC II) of the timber cutting areas harvested during FY 2002 were compared to the Forest Plan Operability GIS layer for each NIC category. Table 2-60 displays the results of that comparison. The NIC components for the planned and implemented FY 2000 and 2001 are displayed for comparison purposes.

Table 2-52. Comparison of the Proportional 2001 Harvest of NIC I and NIC II Using Forest Plan GIS Data to Actual Implemented Harvest Units

	NIC I	NIC II
Forest Plan Planned	66%	34%
Implemented in FY 2002	90%	10%
Forest Plan Planned	48%	52%
Implemented in FY 2001	46%	54%
Forest Plan Planned	82%	18%
Implemented in FY 2000	77%	23%

The information displayed in Table 2-60 indicates that the accuracy of comparison of planned harvest (projected in the Forest Plan) to that implemented on the ground by logging system is variable. A difference of plus or minus five percent is within acceptable limitations of the data and was within these standards for FY 2000 and 2001. The data for FY 2002 is beyond acceptable limits. In general no real trend can be formulated at this time.

Evaluation of Results

No action is necessary at this time; continue to monitor the proportional mix of harvest from NIC II category lands.

Timber Management Question 6: Should maximum size limits for harvested areas be continued?

Goal: Maintain multiple-use values as effected by opening size.

Objective: Determine whether or not a recommendation to change the maximum harvest opening size should be made. Monitor the multiple-use effects of harvest opening size on the Forest.

Background: The 1976 National Forest Management Act (NFMA) regulations established 100 acres as the maximum size for created openings using the even-aged system (clearcutting, seed tree, and shelterwood) within the western-hemlock, Sitka spruce forest type of coastal Alaska. The Forest Supervisor, under certain conditions, can approve created openings of up to 150 acres. The Regional Forester can approve openings up to 200 acres. Factors to consider, when approving openings greater then 100 acres, are provided in the Forest Plan's Forest-wide standards and guidelines for the timber resource. There appears to be no need to pursue change in the maximum opening size or the factors for approving openings greater than 100 acres.

Monitoring Results

During FY 2002, 41 harvest areas (timber stands) were delineated in the Forest's geographic information system (GIS), with corresponding records created in the Forest's Silviculture Information System (SIS) database. Accounting for adjacency (harvested stands that touch one another, which create a larger opening when added together), 24 harvest areas were logged in FY 2002 that created openings using the even-aged silvicultural system. Table 2-53 displays the frequency of openings created through timber harvest during FY 2002.

Table 2-53. Harvest Unit Frequency by Unit Size Fiscal Year 2002

Acreage Range	Number of Openings	Total Number of Acres
1-10	4	24
11-20	4	57
21-30	5	126
31-40	2	62
41-50	2	89
51-60	2	108
61-70	2	134
71-80	2	152
81-90	0	0
91-99	1	92
Totals	24	844

For a five-year period of fiscal years 1998 through 2002 there were 490 harvest even-aged openings created for a total of 14,386 acres. Table 2-54 displays the frequency of these openings. There were four units over 100 acres in size. These units were approved in the decision documents and were in category 1 sales.

Table 2-54. Harvest Unit Frequency by Unit Size Fiscal Years 1998-2002

Acreage Range	Number of Openings	Total Number of Acres
1-10	124	724
11-20	83	1225
21-30	84	2128
31-40	55	1925
41-50	61	2721
51-60	35	1911
61-70	22	1442
71-80	10	752
81-90	5	421
91-100	7	659
101-110	2	203
111-120	0	0
121-130	1	121
131-140	0	0
141-150	0	0
151-160	1	154
Totals	**490**	**14386**

Evaluation of Results

In fiscal year 2002, no created openings exceeded 100 acres in size. The 24 openings averaged 35 acres, and ranged from 4 to 92 acres in size. Trends in harvest opening size have been toward smaller openings and less reliance on the even-aged silvicultural system. Forest Plan standards and guidelines for scenery and sensitive species such as Northern goshawk and American marten, and soil and water BMPs emphasize smaller sizes. Also, emphasis on leaving old-growth structure in harvest areas is resulting in smaller harvest openings.

In addition to the 24 fiscal year 2002 units discussed above, 12 units (considering adjacency) were harvested using either uneven-aged or intermediate salvage harvests. Totaling 381 acres, these harvest units ranged in size from 1 acre to 135 acres.

During the five-year period of fiscal years 1998-2002 of the 490 even-aged units harvested, four exceeded 100 acres. These were category 1 sales and the sizes of these units were approved in the decision documents. In addition to the 490 harvest units on 14,386 acres, there was 2285 acres of uneven-aged management in 57 stands, 815 acres of two-aged management in 27 stands and 288 acres of intermediate or other harvests in 30 stands during the 5-year period.

The system name is based on the number of age classes present after the initial harvest, such as even-aged, two-aged, and uneven-aged. Even-aged systems produce stands that consist of trees of the same or nearly the same age. Two-aged stands result from treatments which leave behind a substantial portion of the original stand structure in the form of large trees distributed or clumped throughout the stand area. The remnant trees left on the site represent one age class, and the newly established trees represent another age class. Finally, uneven-aged systems create stands that include three or more distinctly different age classes by using individual or group selection methods.

Transportation

Goal: Develop and manage roads and utility systems to support resource management; recognize the potential for future development of major transportation and utility systems.

Objectives: Provide access for Forest users and support Forest resource management activities. Manage and maintain roads to protect water, soil, fish, and wildlife resources.

Transportation Question: Are the standards and guidelines used for forest development roads and log transfer facilities effective in limiting the environmental effects to anticipated levels?

Access and Travel Management

The Forest Plan Monitoring and Evaluation Guidebook (May 1999 draft) directs that gates and barriers on closed roads should be visually inspected for integrity and evidence of being bypassed. In FY 2002, information was collected on the existence and effectiveness of roadway features installed to block access to low clearance highway vehicles on all roads surveyed under the Region 10 Road Condition Survey Protocols.

Two types of forest roads were inventoried and analyzed: classified, or permanent roads that are needed for long-term motor vehicle access, but may be periodically closed (placed in storage), and temporary roads, which are not intended for long-term motor vehicle access and are to be closed (decommissioned) after their intended use is complete.

The data presented below is not intended to represent conditions across the Tongass National Forest. It is simply a listing of the blockage features and their effectiveness found in the FY 2002 surveys and collected for this year. Data from surveys in the late 1990s were collected using different protocols. As the rest of the road systems are surveyed using the new protocols, a more complete picture of the effectiveness of road blockage features will be available.

Monitoring Results

Classified Roads

Classified roads are intended for long-term use. During times of inactivity they may be closed to motorized traffic, and placed into a storage capacity. While open to vehicle traffic they may not be suited for low clearance highway vehicles due to the addition of drive-through water bars that are installed to assist in surface water runoff during storms. These roads are suitable for high clearance vehicles such as 4-wheel drive pickup trucks.

Fifty-six individual classified roads with closure devices were visited during surveys performed in FY 2001. The closure device most often encountered was the pit and mound or water bars located near the beginning of the road. Thirty classified roads had pit and mounds or water bars near the beginning of the road; 14 of these were impassable to all vehicles, 15 showed evidence of occasional use by non-highway vehicles such as motorcycles and ATV's, and one showed evidence of use by highway vehicles.

The next most frequent closure device encountered on classified roads was a vegetative cover (23 classified roads). The trees and brush were allowed to grow and closed the roadway through a natural process. These roads typically had pits and mounds also, but the vegetative growth effectively blocked highway vehicles before reaching them. More than half of the roads blocked by vegetative growth (14 classified roads) showed evidence of occasional use by non-highway vehicles.

During FY 2001, three gates were encountered on classified roads; two of these were open, while the third was closed, effectively blocking traffic.

Temporary Roads

Temporary roads are intended for short-term use. The most common temporary road on the forest is one that leads to a landing within a harvest unit authorized by a timber sale contract; others may be access roads to a mine or mineral extraction area authorized by permit or lease; and others may provide temporary access to power transmission corridors by permit. Once the contract, permit, or lease is terminated, temporary roads are stabilized by removing drainage structures, adding water bars, constructing pits and mounds of rock material to block further highway vehicle traffic, and returning the roadway back into vegetative production.

Over 500 former temporary roads were inventoried during FY 2001. Road blockage features most often encountered were pits and mounds as well as water bars near the beginnings of each road (233 former temporary roads). Four of these roads showed evidence of continued use by highway vehicles, while 79 showed occasional use by non-highway vehicles such as motorcycles and ATV's. The next most frequent blockage feature encountered was a vegetative closure at the beginning of the road (198 former temporary roads). Alder and brush that naturally encroached the roadbed closed these roads. These roads typically had pits and mounds also, but the vegetative growth effectively blocked highway vehicles before reaching them. Many of these roads are blocked by alder and brush (78 former temporary roads) showed evidence of occasional use by non-highway vehicles. Of the 500 former temporary roads inventoried, 58 had no effective feature installed to block access to highway vehicles. Since these roads were not decommissioned after their intended use, they are considered unclassified roads.

Evaluation of Results

The monitoring results indicated that pits and mounds/ water bars are effective roadway features when used to block access to highway vehicles on classified roads. Blocking highway vehicles on classified roads was effective at 97 percent of the sites. While 47 percent of the sites showed evidence of occasional use by non-highway vehicles such as motorcycles and ATV's, this incidental use represents the growing popularity of ATV's for both recreation and resource-oriented fieldwork. Growth of alder and brush on classified roads was effective in blocking access to highway vehicles on classified roads in all cases encountered, but non-highway vehicles continued to use 61 percent of these roads. Vegetative blockages were commonly used on classified roads in the past. Because it is not as effective as the pit and mound / water bar, recent road storage projects have relied almost exclusively on pits and mounds since the results are immediate, and not dependent on the growth rate of vegetation.

On former temporary roads, pits and mounds/ water bars were also an effective blockage feature to highway vehicles, blocking access on 98 percent of the roads where this feature was the first blockage encountered, but still allowing access to non-highway vehicles on 34 percent of the roads. Where vegetative growth was established across the roadway blocking access to highway vehicles, non-highway vehicles occasionally continued to use 39 percent of the roads. Continued use of these short-term roads by any wheeled vehicles was not planned and not permitted, therefore more effective closure methods than the traditional pit and mound/ water bars or vegetation cover will be necessary to deter traffic may be necessary to expedite the process of returning these roadway areas to their original forested state. More success in blocking traffic at these sites can be gained by excavating deeper trenches, constructing higher and more irregularly shaped mounds, and blocking ATV traffic from circumventing the blockages in roadside ditches.

Stream Turbidity

Monitoring of stream turbidity during in-stream activity involves a simple, low-cost observation of a water quality standard responding to routine effectiveness monitoring commitments in the USDA Forest Service Memorandum of Understanding with the Alaska Department of Environmental Conservation (1992).

The basis of the turbidity sampling procedure is to determine if Best Management Practices are effective in preventing water quality degradation (using turbidity as the sole parameter of water quality). According to the Alaska Forest Resources and Practices Regulations (11AAC95), "degradation of water quality" means a decrease in water quality such that the affected waters are unable to fully maintain existing or designated uses, but does not include decreases in water quality that are temporary, localized, and reparable. 11AAC95 defines "temporary" as 48 hours or less and "reparable" as an effect that is reversible by natural processes, such that the designated use will return to a state functionally identical to the original.

Details on the turbidity monitoring are included in Soils and Water Question #4, "Are Best Management Practices effective in meeting water quality standards?"

Log Transfer Facilities

Monitoring will continue to be conducted for each log transfer facility (LTF) under terms of the LTF permits, in accordance with Alaska water quality standards and requirements from the Environmental Protection Agency for non-point source discharge. LTF monitoring for this report was accomplished through field inspection and documented through completion of a Log Transfer Facility Monitoring Table. Table 2-35 is designed to tabulate assessments made of the success of the Best Management Practices stipulated as terms of the LTF permits. The assessment elements of the LTF Monitoring table include the following:

Site Identification: Common Name; Corps of Engineer Permit Name, NPDES 402 Permit.

Transfer Activity: Facility Transfer Type; Activity Status; Current year volume.

Fuel Control: Visible Oil Sheen per LTF guidelines M5 of Forest Plan (Alaska Timber Taskforce Guidelines); Discharge Reported to Alaska Department of Environmental Conservation (ADEC) under requirements of Alaska Administrative Code (18 AAC 75.300-307); Discharge Reported to National Response Center (NRC) under requirements of the Clean Water Act (40 CFR 110,117, and 302).

Runoff Control: Reference BMP 14.27 - Drain to Sediment Trap; Vegetated Filter Strip.

Bark and Debris: Reference BMP 14.27 Excessive Churning Prevented; Remove Debris and Bark from LTF/yard; Bark and Debris Properly Disposed; Marine Bark Zone of Deposit; Date Last Dive.

Monitoring Results

Two general types of monitoring occur: upland and marine. The upland monitoring is summarized into assessments developed by Forest Service timber sale administrators, and is recorded under the general categories of "Fuel Control," "Runoff Control," and "Bark and Debris." These assessments were made for all the active sites. Contracted divers performing underwater bark debris surveys accomplish marine monitoring.

Bark Monitoring and Reporting

Bark monitoring is required annually for each log transfer facility (LTF), under the EPA General NPDES Permit No. AK-G670-1000 and EPA General NPDES Permit No. AK-G70-0000. This monitoring is required at sites that transfer a total volume of 15 mmbf or more during the next five years, and are located in less than 60 feet mean lower low water (MLLW). LTFs classified as Type V or VI log transfer facilities under Part I.B monitoring for bark accumulations are not required. If the annual bark monitoring survey conducted at the beginning of the season indicates continuous coverage by bark and wood debris of 0.9 acre or greater, the next annual bark monitoring survey is conducted after cessation of log transfer, or in the following year prior to any additional log transfer. Otherwise the annual bark monitoring survey is not required during years when the LTF is not operating.

The purpose of the bark monitoring program is to determine compliance with the Alaska water quality standards for settable – residues in marine waters. In accordance with 18 AAC Section 70.210, ADEC has authorized a zone of deposit for facilities authorized to discharge under the general NPDES permit. The zone of deposit may include continuous coverage, discontinuous coverage, and trace coverage by bark and wood debris.

Preliminary bark monitoring dives and pre-discharge bark surveys were conducted at 33 LTFs in 2001. Only three of the LTFs, Thorne Bay, Saginaw Bay, and St. John Baptist, had a continuous coverage of bark and wood debris that exceeded both 1.0 acre and a thickness of 10 centimeters at any point (Table 2-63) in 2001. These sites will be managed in a manner that will not contribute to further bark accumulations until the current bark remediation study has been completed and agreed to by all participating agencies. This approach is intended to result in the development of defined methodologies to bring these sites into compliance with current permit requirements.

The bark monitoring conducted in 2001 was done in accordance with the EPS General NPDES Permit Number AK-G670-1000 and EPA General NPDES Permit Number AK-G70-0000. Prior to these permits, there was no standard protocol for bark monitoring. Copies of the surveys for the bark monitoring sites are available from ADEC.

Oil Sheen Monitoring and Reporting

During periods of log transfer operation, receiving waters at the LTF shall be visually monitored daily for the presence of an oil sheen. The presence of an oil sheen shall be recorded, with the date, name of observer, cause or source of oil sheen, and corrective measures taken, and shall be reported to EPA within 24 hours in accordance with Part IX.B.

Table 2-55. Log Transfer Facility Bark Monitoring Dives, FY 2001

Site Name	Common Name	Date Dive Completed in 2001	Zone of Deposit Acres
Appleton Cove 4	Appleton Cove LTF	7/11/01	0.1
Behm Canal 43	Hassler LTF	6/13/01	0.1
Carroll Inlet 23	Carroll Inlet LTF	6/08/01	0.5
Chatham Strait 60	Rowan Bay LTF	6/12/01	0.6
Chatham Strait 99 & 77	Kennel Creek/Freshwater Bay	7/08/01	0.1
Clarence Strait 21	Thorne Bay LTF	6/24/01	2.56
Clarence Strait 24	Coffman Cove LTF	6/24/01	0.18
Davidson Inlet 18	Marble Island East LTF	6/26/01	0
Davidson Inlet 8	Port Alice LTF	6/26/01	0
Eastern Passage 12	Venus Cove LTF	6/27/01	0.1
El Capitan Pass 6a	El Capitan LTF	6/25/01	0
Frederick Sound 18	Portage Bay LTF	6/13/01	0.1
Frederick Sound 34	Saginaw Bay LTF	6/12/01	1.7
Icy Strait 6	Homeshore LTF	7/08/01	0
Neets Bay 12	South West Neets Bay LTF	6/13/01	0
Neets Bay 8	Fire Cove LTF	6/13/01	0.24
Peril Strait 14	False Island LTF	7/11/01	0.3
Peril Strait 21	Todd LTF	7/11/01	0
Peril Strait 29	Hanus Bay LTF	7/12/01	0.2
Shakan Strait 7	Calder LTF	6/25/01	0
Sumner Strait 54	Labouchere Bay LTF	6/25/01	0
Sumner Strait 78	Rynda LTF	6/28/01	0
Sumner Strait 81	St. John LTF	6/26/01	0.4
Tenakee Inlet 20	Crab Bay LTF	7/09/01	0
Tenakee Inlet 21	Indian River LTF	7/10/01	0.1
Tenakee Inlet 24	Inbetween LTF	7/09/01	0
Tenakee Inlet 25	Corner Bay LTF	7/10/01	0.6
Tuxekan Pass 6	Naukati LTF	6/26/01	0
Tuxekan Passage 2	Nichin Cove LTF	6/26/01	0
Twelve Mile Arm 1	East Twelve Mile South LTF	7/11/01	0.5
Ulloa Channel 4	Suemez/Refugio LTF	6/27/01	0
Yakutat Bay 6	Sawmill Cove LTF	7/24/01	0
Zimovia Strait 101	King George LTF	6/29/01	0

Evaluation of Results

In 2001, all active log transfer facilities were operated in accordance with their permits. The cases where fuel/hydraulic fluid spills were a problem were handled as specified in the Spill Prevention Control and Counter Measure Plan (SPCC) anticipated in their operating plans. The actions of the sale administrators, which are prescribed in the standards and guidelines for log transfer facilities, have served to limit the environmental effects of LTF operation to anticipated levels. The guideline for locating LTFs along straits and channels proved to be effective in reducing underwater bark accumulations.

The Daily Oil Sheen Logs proved to be very useful in documenting causes of sheens and corrective actions. The logs are required by stipulation of NPDES permits in some cases and by Forest Service contract in others.

Wetlands

Goal: Minimize the destruction, loss, or degradation of wetlands and preserve and enhance wetland functions and values.

Objectives: Avoid alteration of or new construction in wetland whenever there is a practicable environmentally preferred alternative. Implement Best Management Practices and estuary, riparian, and soil and water standards and guidelines specific to wetlands.

Background: Wetland implementation monitoring will follow established protocols for 100 percent BMP implementation monitoring. Additionally, a representative sample of harvest units and associated roads will be monitored annually using an interdisciplinary approach. Avoidance of wetlands will be monitored Tongass-wide each year, through GIS and field reconnaissance analyses.

Currently, the Tongass National Forest does not have an approved method to evaluate the effectiveness of BMPs related to impacts of management activities on wetland functions and values. Each environmental impact statement completed for projects that contain wetlands includes evaluation and finding for impacts relative to wetlands. Studies exist that partially answer functional effectiveness questions. Some of these studies are complete and some are ongoing. No one study gives the answer to all the functional questions associated with management activities in wetlands.

Wetland Question 1: Are Wetlands standards and guidelines being implemented?

Implementation Monitoring

The information provided in Table 2-64 was from project implementation of Category 3 and 4 timber sales, those timber sale projects for which the project-level NEPA was done post Forest Plan Revision ROD (Forest Plan ROD, 1997). The activities that took place in 2002 were developed to achieve consistency with the revised Forest Plan.

Table 2-56. Total Acres of Wetlands Harvested and Miles of Road Constructed for the Tongass National Forest Managed in FY 2002

Total Wetland Acres*	Wetland Acres Harvested	% Total	Wetland Acres ** Impacted by Road Construction	% Total
5,709,069	37 ac.	<0.1%	3 ac.	0.1%

* Total acres of mapped land (excluding private lands and some wilderness areas). Data was from Tongass Soils GIS layer (CLU, or Common Land Unit), second growth, and roads database.
** Based on an average of a 40-foot wide road

Monitoring Results

Total wetlands impacted by roads were approximately 3 acres. These roads were built in the South Arm Timber Sale (Chasina EIS). Of the total wetlands on the Forest (mapped wetlands, which exclude some wilderness areas and private lands), this accounts for less than 0.1 percent of the total wetlands. Forested wetlands were most affected by disturbance from road construction.

Total wetlands impacted by harvest units were 37 acres. Timber harvest occurred in the Twin Creek, Kuakan, Deer Run Salvage and Salty timber sales on the Wrangell, Petersburg and Ketchikan-Misty Ranger Districts, respectively. Of the total wetlands on the Forest (excluding some wilderness and private lands), this accounts for less than 0.1 percent of the total wetlands. Forested wetland and palustrine emergent wetland complexes were most impacted by timber harvest. Of the total acres harvested in FY2002 (436 ac), wetlands comprised approximately 8.5% of that. Prescriptions are developed and implemented to minimize impact to wetlands. Timber harvest is not a restricted activity on forested wetlands, according the Forest Plan Revision.

With less than 0.1 percent of the total wetlands impacted by road construction and timber harvest, the Tongass National Forest has fulfilled the intent of the standards and guidelines during the year 2002 in avoiding wetlands where practicable. Even with the combined effects of Fiscal years 1998, 1999, 2000, 2001 and 2002 activities on wetlands, the Forest is illustrating avoidance of wetlands in its management activities.

BMP Implementation Monitoring

BMP implementation monitoring for wetlands (BMP 12.5) follows Tongass National Forest Best Management Practices Implementation Monitoring Strategy (June 1998) protocols. Results from that monitoring are reported in the annual BMP Implementation Monitoring Report.

Summary of results in BMP Report taken from 2002 BMP Implementation Monitoring Report

The Best Management Practices (BMPs) for wetland standards and guidelines were monitored on the Tongass through guidelines described in the Tongass Monitoring Strategy. The strategy was developed to provide direction for Tongass Land Management Plan implementation monitoring. The BMPs evaluated are included in the Soil and Water Conservation Handbook (FSH 2509.22, October 1996).

Refer to the 2002 BMP Monitoring Report included in the Appendix D (check) for details on how the monitoring was conducted. A summary of the findings for soil and water resources is given below in Tables 2-65 and 2-66.

BMP Monitoring Results

BMP 12.5 – Wetland Protection Measures

The BMP for Wetland Protection Measures was monitored on 2855.5 acres through the 100 percent implementation monitoring effort and the 10 percent quality control monitoring. Specifically, 46.7 acres of delineated wetlands identified in timber sale environmental documents were monitored in the 100 percent monitoring effort; 2.0 of these acres were monitored by the 10 percent quality control IDT.

Table 2-57. Summary of BMP Use, Number of Departures and Corrective Actions

BMPs Applied	Number of Times the BMP was Appropriate for Use	Number of Departures from Full BMP Implementation	Number of Times Corrective Action Applied
12.5	21	0	1*

* Corrective action suggested was not required under BMP 12.5, or in the Forest Plan Revision.

Table 2-58. Summary of BMP Use, Number of Departures and Corrective Actions for FY 2002 monitored by IDT in the 10% quality control sample

BMPs Applied	Number of Times the BMP was Appropriate for Use	Number of Departures from Full BMP Implementation	Number of Times Corrective Action Applied
12.5	4	0	1*

Corrective action suggested was not required under BMP 12.5, or in the Forest Plan Revision.

A total of 16 units and 18 roads were monitored this year through the 100-percent implementation monitoring process. A subset of the total BMP implementation monitoring pool consisting of 3 units and 2 roads that were monitored during the 10 percent IDT monitoring process. The tables and statistics discussed reflect results from the total units and roads monitored in the 100 percent and 10 percent IDT monitoring efforts. Results of the 100-percent monitoring of units and roads for BMP 12.5 in FY 2002 concluded that the BMP was fully implemented at all sites.

Wetlands were identified in a few of the units, isolated wetland areas were deleted or boundaries changed to avoid impact to muskeg and fen areas. At the culvert reconstruction sites in wetland areas, clearing operations were kept at a minimum. Native riparian vegetation was replaced where possible. Excavated materials from the culvert installation were hauled from the wetland areas. In units where forested wetland was harvested, partial to full suspension measures were prescribed and implemented. Full suspension was achieved in most of the areas of forested wetland. Specific yarding systems were designed and utilized under the close supervision of the sale administrator in wetland areas. Very little to no soil disturbance was noted in the harvested wetland areas monitored.

There was one corrective action noted relative to wetlands in one of the Salty Timber Sale units. This note was an emphases point, brought out by an IDT monitoring group member, concerning the unit layout relative to wetlands. The action activity identified was not an actual requirement of the Forest Plan Revision or within the BMP 12.5 guidance. Reviewing the unit, the layout included 0.5 acre of forested wetland in the southwest corner. The standards and guidelines provide for harvest in forested wetlands so changing the unit configuration is not necessary. Partial suspension was prescribed and full suspension achieved in the wetland area.

Evaluation of Results:

The Best Management Practices are being implemented on the Tongass National Forest. The high quality work of the individuals involved with the site investigations, layout, unit design, environmental assessment, and contract administration has contributed to this success. Training on wetland identification and protection conducted on the Tongass as well as communication about wetland protection has increased the knowledge of sale administrators and engineers. The sale administrators actively avoided wetlands and implemented protective prescriptions on wetlands. They deleted wetland areas, and added buffers and retention areas to protect wetlands. The logging systems were specifically designed with prescriptions for wetlands. Continued emphasis needs to be placed on identifying these wetland areas during environmental assessment and layout.

Comparing the monitoring results this year to the past three years, the BMP has been consistently implemented successfully. The BMP was applied only one-third as many times as last fiscal year. This decrease reflects the significant decrease in the units and acreage harvested. Many of the wetland areas have been deleted from the units and roads prior to layout so this BMP is not used as frequently in the units laid out under the new standards and guidelines. Many of the units were selective cut and partial retention units on steep terrain, where there was less wetland. The developed harvest prescriptions minimize impacts to wetlands and these harvest prescriptions have been successfully implemented.

With less than 0.1 percent of the total wetlands impacted by road construction and timber harvest, the Tongass National Forest has fulfilled the intent of implementation standards and guidelines during the implementation of the Forest Plan in avoiding wetlands where practicable. Even with the combined effects of Fiscal years 1998, 1999, 2000, 2001 and 2002 activities on wetlands, the Forest is illustrating avoidance of wetlands in its management activities. Overall, Best Management Practices are being implemented where applicable, according to the 100 percent sampling results by sale administrators and engineering representatives, as well as the spot sampling conducted by the Tongass BMP oversight team. This has been the case for the last 5 years of monitoring. Trends indicate that BMPs are being prescribed site specifically and are being fully implemented.

Wetland Question 2: Are Wetland standards and guidelines effective in minimizing the impacts to wetlands and their associated functions and values?

Monitoring Results

During FY 2002, the Forest ecologist continued into the second year of data collection for the wetland classification. The wetland classification was identified in fiscal year 2000 to be a critical component to developing effectiveness-monitoring protocols. The wetland classification is also part of a larger classification effort initiated under the Existing Vegetation module of the Natural Resource Information System (NRIS).

FY 2002 fieldwork included survey of six major landscapes. Plot samples of wetland plant communities were taken in the areas of Mitkof, Zarembo, and Revilla Islands, Cleveland Peninsula, and the mainland near Muddy and Patterson Creeks. Approximately 178 plots were sampled, primarily on lowland wetland types (elevations less that 1500 feet). Plot data included complete species lists, species composition, soil characterization, and other site data. Plot data were entered electronically into ACCESS. Eventually the data will also be migrated into the TERRA database, depending on when this system will be available to the Forest. Plot locations for all 178 sites were also entered into the GIS database.

Additional plot sampling will be conducted in FY 2003, focusing efforts on upper elevations and other wetland communities where data gaps are found. Analysis of data gaps will be conducted during fiscal years 2003 and 2004 by evaluating other data sources such as Forest Inventory and Assessment plots, (FIA), existing vegetation accuracy assessments plots, and other sources.

Progress on implementing the wetland effectiveness studies discussed in last year's Monitoring and Evaluation report moved forward during FY 2002 in several ways: 1) the wetland classification, a necessary precursor to implementing effectiveness monitoring studies, continued as mentioned above; and 2) the wetland monitoring group, composed of Forest and Research soil scientists, hydrologists and ecologists, developed a plan of action to get closer to the wetland effectiveness question. This included the assignment of a formal literature review related to wetland baseline characteristics and functions relative to SE Alaska. The Forestry Sciences Laboratory research soil scientist will take the lead on this literature review, with assistance from the Tongass ecology group. The literature review is expected to contain information on all known literature (peer-reviewed publications, administrative studies and other quality studies that may not be published) related to the baseline characteristics of wetlands and their associated functions for systems found in Southeast Alaska. This report is due at the end of FY03. After the literature review is complete, the protocol team will meet to determine if pursuing the studies mentioned in previous monitoring reports (i.e." The impacts of forestry roads on peatlands within the Tongass National Forest, Southeast Alaska, 1999" and "Effects of forest roads on surface and subsurface flow in Southeast Alaska, 2000.") are still the direction we wish to go, if the development of new protocols are needed.

Implementing wetland effectiveness monitoring protocols has been discussed relative to the development of Case Study Watersheds (the riparian and aquatic synthesis for Forest Plan monitoring). The monitoring group for wetlands made a decision that the wetland effectiveness monitoring cannot count on the Case Study Watersheds due to the difficulty in getting that monitoring protocol funded, as well as the difficulty in actually finding paired watersheds suitable for such studies. If needed, future wetland effectiveness monitoring will move forward with or without the Case Study Watershed.

A direct answer to the wetland effectiveness question is still pending at this time. We will not know if wetland standards and guidelines are effective in minimizing the impacts to wetlands and their associated functions and values until the wetland classification is complete, the literature review is complete, and a final decision on whether to pursue additional monitoring is answered.

An evaluation of the wetland effectiveness results is still pending at this time. We will not know if wetland standards and guidelines are effective in minimizing the impacts to wetlands and their associated functions and values until the wetland classification is complete, the literature review is complete, and a final decision on whether to pursue additional monitoring is answered. If needed, the

monitoring protocols have been tested in previous studies; therefore there is a high confidence that they will provide appropriate information regarding the effectiveness of standards and guidelines on several (but not all) functions and values. These protocols will also be incorporated into other riparian and aquatic monitoring, specifically the case study watershed studies, if they are pursued. The wetland classification will be a useful tool for not only understanding wetland functions and values, but for many interpretations of forest management on these plant communities.

Wild and Scenic Rivers

Goal: Maintain the outstandingly remarkable values and the free flowing conditions of rivers designated or recommended for designation as components of the National Wild and Scenic Rivers System.

Objectives: Manage all rivers recommended for designation as Wild, Scenic, or Recreational rivers in the Tongass Land and Resource Management Plan to maintain their eligibility pending designation by Congress into the National Wild and Scenic Rivers System.

Background: The Wild and Scenic Rivers Act of 1968 established a policy for preserving selected rivers in a free-flowing condition that would balance the development of water, power, and other resources on rivers of the United States. Rivers are eligible to be considered for inclusion in the National Wild and Scenic Rivers System if they are essentially free flowing (without major dams, diversions, or channel modifications) and if they possess at least one "outstandingly remarkable" scenic, recreational, geologic, fish, wildlife, historic, cultural, or other similar value. These values should be a unique or exceptional representation for the area.

Wild and Scenic River Question 1: Are Wild, Scenic, and Recreational River standards and guidelines being implemented?

The standards and guidelines are being implemented for the free flowing conditions and outstandingly remarkable values for eligible rivers on the Tongass National Forest.

Monitoring activities in 2002 to support these findings include:

1) Monitoring visitor use at the Anan Wildlife Observatory within the corridor of Anan creek on the Wrangell District. There were 2,634 visitors to this site during the staffed season in 2002.
2) Monitoring the Blind River corridor on the Petersburg District by evaluating visitor use at several recreation sites within the corridor and by reviewing outfitter and guide use.
3) Monitoring the Hasselborg and King Salmon rivers on the Admiralty National Monument. The Hasselborg receives more use primarily due to the nearby recreation cabin and excellent fishing opportunities.
4) Monitoring the Kegan and Essowah Rivers and Lakes systems on the Craig Ranger District.
5) Monitoring visitor use in a number of other locations.

Monitoring Results

Existing use on the Hasselborg and King Salmon rivers managed by the Admiralty National Monument appear to be within the allowed standards and guidelines for recreational outstandingly remarkable features and they appear effective in managing the rivers. This is based primarily on anecdotal evidence, reviews of outfitter/guide actual use records and very limited direct monitoring.

Specific visitor data at the recreation sites along Blind River was not collected as consistently during FY2002 as in the past due to lack of personnel. Recreation maintenance crews and campground host volunteers did observe trends, however. As in years past, Blind River Rapids Trail and Blind Slough Picnic Area had high use during times of good weather and strong fish runs. Five outfitter/guides are permitted for the Blind River Rapids area.

The Craig Ranger District has seen no change in the Kegan or Essowah Rivers and Lakes systems that would indicate effects to the eligibility of these recommended rivers.

The Wrangell Ranger District staffed interpreter positions at the Anan Creek Bear Observatory and monitored the use of almost 2,700 visitors there. Information was collected about the viewing public, outfitter or guide use, and bear behavior.

Evaluation of Results

Standards and guidelines are being implemented, and used to direct management decisions. Eligibility of specific classifications levels recommended in the Forest Plan is being maintained until Congress makes these designations.

Based on two aerial surveys and information collected from local residents with knowledge of the area, the Blue River within the Mist Fiords National Monument receives very little, if any, use. The area is extremely difficult to access and this deters most people who would consider going there. As a result, the Blue River continues to meet all criteria for a wild river designation.

While vehicle numbers at the recreation sites on Blind River on the Petersburg Ranger District were quite high at times, the areas away from established recreation sites had very few visitors. It is difficult to get a good count of the dispersed users who recreate along Blind River. The visitor levels from local use and outfitter/guide use fit the guidelines for Roaded Natural, which is the ROS class for the whole river corridor.

One monitoring project that has not yet been completed due to lack of funds is an airborne video flight of Blind River. This low altitude flight would take video and digital still photos of the whole river corridor. This would be a good baseline tool to use in future years to compare any physical changes taking place in the corridor. This would also be worthwhile on other rivers recommended for designation. But it would be particularly useful on Blind River since it is connected to the city of Petersburg by road and receives a high amount of recreation use. Most of the other recommended rivers on the Petersburg Ranger District are located in very remote areas with little recreation use.

It is important to continue analyzing proposed timber sales for their impacts on the eligibility of recommended rivers.

Wild and Scenic River Question 2: Are Wild, Scenic, and Recreational River standards effective in maintaining or enhancing the free flowing conditions and outstandingly remarkable values at the classification level for which the river was found suitable for designation as part of the National Wild and Scenic River System?

The Recreational River standards are effective in maintaining and enhancing the free flowing conditions and outstandingly remarkable values.

Monitoring Results

The staff at the District offices that reported monitoring results noted that the standards for maintaining or enhancing the free flowing conditions and outstandingly remarkable values for the rivers are effective.

Evaluation of Results

The Wrangell Ranger District reported that there were almost 2700 visitors to Anan during the staffed season in 2002. Of the people visiting, 88 percent were non-local and 12 percent were local visitors.

The Ketchikan-Misty Ranger District reported that there are few, if any, current threats to the Blue Rivers' suitability for designation as a part of the National Wild and Scenic River System.

The Craig Ranger District notes that there have been no changes at the Kegan or Essowah Rivers and Lakes systems that would indicate effects related to the eligibility of these recommended rivers.

Winter recreation activities on Blind River have not been monitored as closely as summer activities because there is no regular maintenance program for the area in the winter. Most information comes sporadically from Forest Service employees who recreate in the area and report back use levels. Ice-skating on Blind River is a very popular activity for Petersburg residents, when the weather conditions allow. Since the ice conditions are usually not suitable for long, the number of people at Blind Slough Picnic Area can be quite high during good conditions. Cross-country skiing and snowmobile use are also popular in the area when snow conditions are appropriate. Since part of the area is closed to snowmobile use in the winter, there is a need to continue monitoring it for compliance. This area is one

of the few places in Southeast Alaska where trumpeter swans stay all winter. It is one of the reasons for the high wildlife values in the river corridor.

The proposed state ferry terminal at the southern end of Mitkof Island by 2006 could significantly change recreation use patterns and levels along Blind River. This use will need to be monitored to ensure that the standards and guidelines for a Recreation River are being met and that the outstandingly remarkable values are being maintained.

Wilderness Areas

Goal: Manage designated Wilderness to maintain an enduring wilderness resource while providing for public access and uses consistent with the Wilderness Act of 1964, and the Alaska National Interest Lands Conservation Act of 1980, as amended (ANILCA).

Objectives: In Wilderness, manage for the adopted Recreation Opportunity Spectrum (ROS) class. Where the ROS has not been adopted, manage for no greater development than Semi-primitive Motorized (with certain localized exceptions due to the effects of activities outside Wilderness and ANILCA exceptions).

Background: Congressionally designated Wilderness in the Tongass National Forest comes from two pieces of legislation. ANILCA established 14 Wildernesses totaling 5.5 million acres within the Tongass. Two of the areas – Admiralty Island and Misty Fiords – were also previously designated as National Monuments. Before ANILCA, there was no designated Wilderness on the Tongass. In 1990, the Tongass Timber Reform Act (TTRA) amended ANILCA and designated five new Wilderness areas and one Wilderness addition totaling 296,080 acres. This brings the total to 5.7 million acres in 19 Wilderness areas on the Tongass National Forest.

Wilderness Area Question 1: Are standards and guidelines for the management of Wilderness being implemented?

In general, the standards and guidelines for the management of Wilderness are being implemented. The geographic distribution and expanse of the 19 Wilderness units totaling 5.7 million acres, along with limited staffing and budgets, make the implementation of standards and guidelines difficult.

No monitoring was accomplished in the following Wilderness units in FY 2002: Coronation Island, Karta River, Kuiu, Maurille Islands, Petersburg Creek/Duncan Salt Chuck, Pleasant/Lemusurier/Inian Islands, South Etolin, Tebenkof Bay, and Warren Island.

Chuck River

The Admiralty Monument/Juneau Ranger District made two brief monitoring trips to this Wilderness in 2002.

Endicott River

A Minimum Requirement Decision Guide was processed and signed by the Regional Forester to allow the use of helicopters for a monitoring trip during moose hunting season into this remote unit. There are four sand/gravel bars that provide locations for public and outfitter access by wheeled, fixed-wing aircraft. These locations and this mode of transport do not meet minimum aviation safety requirements for Forest Service employees.

Kootznoowoo

The Admiralty National Monument/ Kootznoowoo Wilderness is in the process of developing an invasive plant plan with other resource specialists that will include survey protocols and eradication methods. In FY 2002, invasive plant surveys focused on sites where introduction of plants would most likely occur such as old canneries, fox farms, and sites occupied under special use permits. Species identified included field mustard, dandelions and bluegrass. A large harvest of turnips was discovered near a cabin under special use permit.

Two wilderness rangers spent the field season monitoring visitor use in the more remote areas of Admiralty Island. They encountered 48 groups (1/3 guided) with about 150 individuals over a 90-day season, which is well within the standards and guidelines.

The 1.2-mile Kanalku Lake Trail was reconstructed to reduce stream bank erosion and degradation. In addition, fourteen cabins and 28 miles of trail were maintained. Almost all special use permit cabins and temporary platforms were inspected and found to be generally in compliance. Two administrative cabins were inspected and scheduled for removal. The cabins in question had not been used by the Forest Service or for emergency shelter by the public.

Visitation at Pack Creek Bear Viewing area declined in 2002. Non-guided visitor use was unchanged, but guided visitor use declined by 20%. Total visitation during the season has historically approached 1400 people, but that figure declined by 11% in 2002.

During the 2002 field season, 117 campsites were inventoried using the Tongass Level 2 protocols. Among those were 26 sites also inventoried more extensively, using detailed Level 3 methods begun on Admiralty Island in 1984.

Misty Fiords National Monument

Monitoring efforts for this field season focused on 17 areas identified from previous year's data as the core use areas of the Wilderness. These are the main travel routes and destinations for independent users, flight seeing, charter tours and cruise ship tours. This seasons efforts focused exclusively on monitoring existing conditions along the saltwater shoreline and main travel corridors to popular lakes. Monitoring included campsite inventory, cultural/historic site monitoring, fixed point encounter monitoring and monitoring on an "as seen" basis during the course of a field day.

The agreement with the University of Arizona in cooperation with the USDI Fish and Wildlife Service to test a computer software model to display visitor use on a portion of the Misty Fiords National Monument was completed. Randy Gimblett of the University of Arizona submitted a final report in September of 2002 (Gimblett 2002) This software is being evaluated for its utility for future monitoring of visitors in the landscape to track use trends, concentrations of use, and areas of potential impacts. The Fish and Wildlife Service is interested in testing whether or not this model can interact with other data in GIS to identify potential impacts to wildlife or fisheries resources.

The Misty Fiords Interagency Team completed a preliminary draft of the Joint Management Strategy in Fall, 2002. This document defines a shared vision for current and future management by six state and federal agencies with varying jurisdiction in the National Monument. It is composed of guiding principles and management objectives that address several resource areas of concern. The statements represent a philosophy of cooperative management and are not binding agreements. These statements do not supercede existing management policies.

Russell Fiord

District and SO staff conducted a monitoring trip to this Wilderness in May to inspect permitted outfitters and examine past illegal outfitter camps and tent frame sites. The most significant event of the season occurred when Hubbard Glacier advanced and closed off the fiord, creating a lake between May and August. This natural event triggered an intensive monitoring effort by a range of resource specialists. Biological technicians conducted fish habitat assessments and spawning habitat of the tributary systems of the newly formed lake. They also surveyed winter habitat conditions for moose that was being lost due to the rising lake levels. There were many other monitoring efforts ongoing by surveyors and resource specialists until the lake once again became a fiord and released the dammed up water in spectacular fashion. This glacial process is likely to be repeated and the District is focusing short and long range monitoring efforts on several projected resource impact scenarios for future implementation.

South Baranof

The Sitka District conducted a monitoring trip to this Wilderness during the 2002 field season. An illegal driftwood cabin on Yamini Island was inspected and twenty-three campsites were inventoried, photographed, and rehabilitated as needed. One temporary outfitter/guide campsite was inspected for compliance. Several facilities such as fish hatcheries, weirs, and water pipelines under special use permit were inspected for compliance.

South Prince of Wales

The Craig District conducted a monitoring trip to this Wilderness in July of 2002. In the past monitoring efforts had focused on systematically visiting eight established points for evidence of recreation use. After twelve years of this effort, a synopsis concluded that there had been very little change and hardly any impacts from year to year at the monitored sites. As a result, this years monitoring focused on a more complete inventory of campsites and associated impacts of recreation use. A total of twenty-nine campsites were inventoried during this trip.

Stikine – LeConte

The Wrangell Ranger District monitored a potential land purchase; special use permits for outfitters and guides, isolated cabins, pre-ANILCA cabins, tent platforms, and research studies (The Geophysical Institute of the University of Alaska in Fairbanks is investigating the rapid retreats of tidewater glaciers and preparing interpretive brochures on the subject. The US Geological Survey monitors river flow and water levels on the Stikine River near the gauging station near Shakes Slough); various authorizations for the use of motorized equipment within Wilderness; and the management of public recreation facilities and sites as a part of their regular program of work.

Tracy Arm – Fords Terror

Wilderness rangers of Admiralty Monument/Juneau Ranger District monitored this Wilderness and encountered 128 individuals in 37 groups (25% guided) on the upland portions of the district during the season. If saltwater encounters are included, wilderness visitors often encountered more than six groups per day. Heavily used salt water zones are visited by over thirty groups per day includes tour boats and cruise ships.

Although the Alaska Department of Fish and Game did not study seals in Tracy Arm this year, the Forest Service kayak ranger crew continued the cooperative seal study with the University of Alaska. Rangers counted seals, monitored boat/vessel interactions and seal behavior, recorded boat activity and monitored cruise ship emissions. The timing of peak populations at the end of July and the numbers of seals were similar to those recorded in 2001. A high of 1171 seals were recorded in Tracy Arm and a high of 823 seals were recorded in Endicott Arm between May and July.

Due to the increase in cruise ship visits to Tracy Arm, a Wilderness ranger attended air quality training and attempted to monitor the impact to this resource during the FY2002 field season. See the enclosed photo of cruise ship smoke in Tracy Arm.

West Chichagof – Yakobi

(The Sitka Ranger District Twelve inventoried) Twelve campsites were inventoried in this Wilderness area in 2002. Trail condition surveys were completed on the Mirror Harbor and White Sulphur Trails. A total of 15 outfitter/guides use this Wilderness using about 280 service days. A trespass structure was located and disposed of at Khaz Head. White Sulphur Springs continues to be the hotspot for outfitted groups in this unit. The springs are a popular destination and with a recreation cabin nearby. Recreational use is high and the encounter rate may exceed the primitive ROS standard for Wilderness (Less than 3 parties per day per trip with less than 12 people in the party) (Tongass Land Management Plan 4-46 through 4-48).

Monitoring Results

Endicott River

Overall, the areas used to land aircraft and associated campsites were in good condition. The area exists in a primarily pristine condition due to its remote location and very difficult access. Trash from camps was less than expected. These camps are normally monitored every three years. Visitors do frequent the area prior to moose hunting season and efforts may be made to visit the area during the summer.

Kootznoowoo

The Forest standards and guidelines are being implemented, but they are often so general that further guidelines at a more area-specific level need to be developed. For example, Limits of Acceptable Change (LAC) standards are not adequately addressed in the standards and guidelines for the Forest Plan and they have not been implemented at the individual wilderness level.

Overall, it is very difficult to assess with real confidence what the level of non-commercial use is and who is using the Wilderness. Reports of crowding continue to be passed along to the Forest Service, but the limited monitoring that is taking place does not indicate that crowding is occurring in most locations. Most crowding concerns are related to encounters that occur on salt water in bays and near good anchorages.

In the Level 3 surveys conducted at the same sites using the same protocols as in 1984 the following results were obtained.

- Most study sites showed a sustained and consistent use since at least 1984.
- The most noticeable change on sites is the reduction of ground cover due to trampling where a consistent decrease from natural conditions has continued.
- Trees continue to be felled or damaged and trails are becoming more frequent at these sites.
- The exposure of dominant overstory tree roots increased by 75% in higher use sites

Enclosed is an example of an illegal structure on an extremely impacted campsite in Seymour Canal on Admiralty Island.

Some previously used recreation sites did recover thoroughly. These sites exhibited reestablished groundcover, mossy roots and litter cover since their use was discontinued in 1984. All 117 inventoried sites were entered into the INFRA database.

Misty Fiords National Monument Wilderness

Current levels of recreational and other uses in some areas immediately adjacent to and in the air above the land base of Misty Fiords National Monument Wilderness continue to impact solitude and the primitive Wilderness environment.

The noise and visual impacts from motorized vessels on adjacent marine waters outside Forest Service jurisdiction continue to be issues of importance because of the affect on upland recreational uses like fishing, camping, and hiking. ROS guidelines are easily exceeded along shoreline areas when marine use is factored into the number of allowable National Forest encounters, or 6 parties per day, with a maximum of 12 persons per party in the semi-primitive non-motorized ROS class.

Even though we have the Final Report from Arizona State entitled “Modeling the Impacts of Recreation Visitation on Misty Fiords National Monument, Tongass National Forest,” the lack of funding prohibited field validation of this effort in FY 2002. Only one year of indirect data from logbooks, trip records and other sources was used to initiate this effort using the RBSim 2 modeling software. Some user groups were sampled at an estimated level of 90% and others at less than 5%.

The above Final Report did provide good information on the current pattern of use in Misty Fiords. This information documents many results that could have been arrived at intuitively, but we can now begin to see the more heavily used areas and the nature of that use. For example:

- The peak season of use is about 70 days long during July, August and early September.
- The aggregating of commercial and noncommercial trips totaled to 2,149 trips; 72% were floatplane trips (1549) and 13% (275) were cruise ship trips. Cruise ships contain an average of 2000 passengers and have a much greater impact on and conflict with other modes of travel. Passengers on some of these ships have the opportunities to leave the ship by zodiac to view wildlife or natural features.

- Thirteen destinations with higher use were evaluated on encounters by mode of travel during the season. Rudyerd Bay and associated dock had the highest number of encounters at 1301 during the season.

The Misty Fiords Joint Management Strategy is in draft form and when finalized will guide future planning efforts. It contains eight Guiding Principles and many Management Objectives in key areas of public and agency concern. This framework will be incorporated in future projects that might be initiated by any of the state or federal agencies that cooperated in the effort.

South Prince of Wales

- The monitoring trip in South Prince of Wales Wilderness found a location where three trees had been cut. This area has a history of timber theft and this year there had been several reports of fresh stumps by island residents. A 61-inch diameter Sitka spruce had been removed from the area. This incident was investigated by law enforcement but no citation was issued. An abandoned ADF&G cabin site was also inspected. An effort will be made to remove the cabin, outhouse, pieces of fish weir and old fuel cans after checking with ADF&G.

Stikine-LeConte Wilderness

- In 1999, the owners of a 160-acre parcel in the Wilderness on Farm Island offered to sell their land to the Forest Service. The property is known as the North King Slough Parcel. The parcel was again submitted as an FY2004 land acquisition nomination through the Land and Water Conservation Fund.

Tracy Arm – Fords Terror

- Air quality monitoring in Tracy Arm met with mixed success this year. Measuring opacity in the area is challenging due to the monitoring protocols requiring the ship to be stationary in relation to the location of the sun. At the current level of use by cruise ships, air opacity is believed to be acceptable in this scenic glacial fiord. Increases in cruise ship traffic could reduce the opacity. We may have to modify the existing protocols or develop another one that is geared to measuring moving ships and different sun positions.

Evaluation Results

- An interagency collaborative planning approach is being initiated to deal with future planning efforts in Misty Fiords National Monument.
- Every effort must be made to attempt to validate the RBSim 2 model initiated in Misty Fiords National Monument and not lose the investment in this new technology.
- The deferred maintenance of recreation cabins and trails in Wilderness will be emphasized and additional funds will be requested to maintain the facilities to an acceptable standard.
- Monitoring will continue in areas where illegal or abandoned structures exist or have a history of being rebuilt every year. Efforts will be made to remove these structures and restore the site.
- Monitoring will continue for outfitter/guide permit compliance and evidence of trespass uses in all Wilderness units.
- The plant monitoring programs in several of the Wilderness areas should continue to further develop the baseline inventory of these remote Wilderness areas. Plant monitoring will ensure that Wilderness standards and guidelines are being met for Threatened, Endangered, and Sensitive Species, as well as establishing a baseline to monitor plant populations in the Wilderness.
- There are several locations where the level of use is of concern and monitoring needs to continue to determine if any mitigation is required. Some of these areas include Tracy Arm, Rudyerd Bay in Misty Fiords and White Sulphur Springs in West Chichagof-Yakobi.
- Campsite inventory and entry into INFRA needs to continue to monitor impacts of Wilderness recreation use.

Wilderness Area Question 2: Are standards and guidelines for the management of Wilderness effective in maintaining the Wilderness resource?

Monitoring activities are summarized in Wilderness Area Question 1. Time spent in the field or office for implementation monitoring was also used to determine effectiveness. The standards and guidelines were effective in maintaining the Wilderness resource with the exceptions as discussed below. The geographic area's large size and complexity, along with limited budgets, make implementation of standards and guidelines difficult to monitor for effectiveness. Conclusions from the area surveyed during FY 2002 indicate that backcountry physical impacts are minimal and the opportunities are outstanding for remoteness and solitude.

Evaluation of the effectiveness of the standards and guidelines continues to be difficult because of impacts from uses in the air space and on salt water that are outside the jurisdiction of the Forest Service.

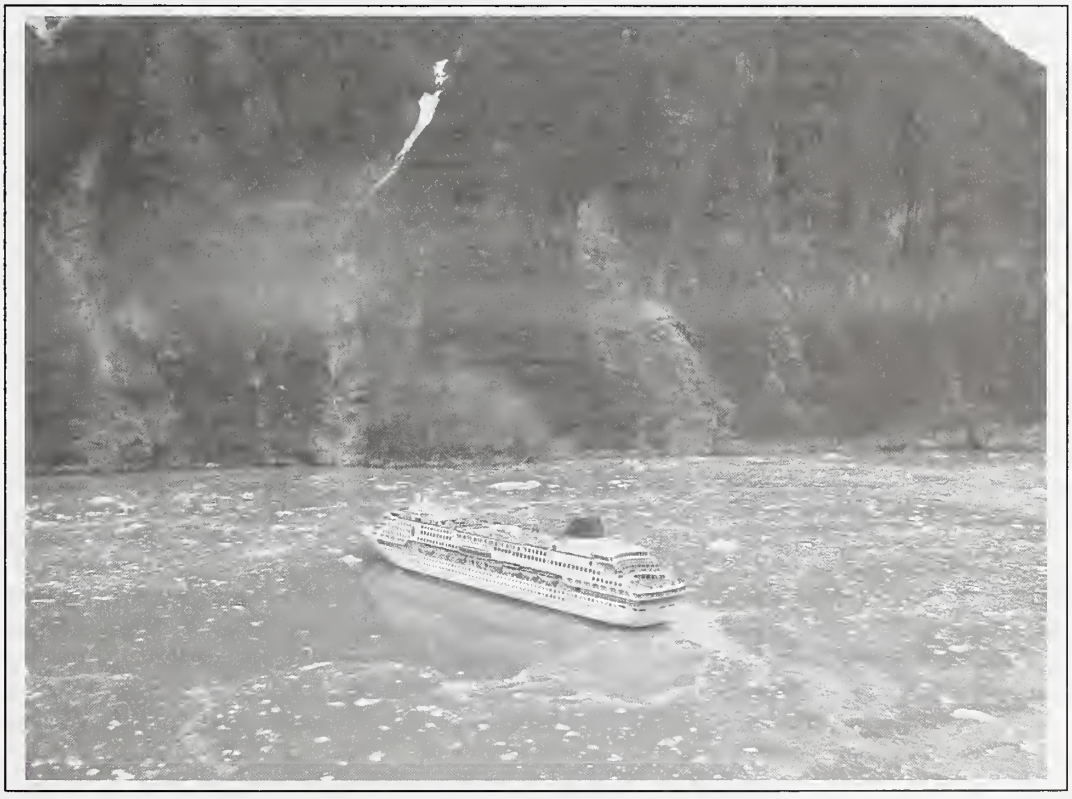
Monitoring Results

Noise impacts from motorized vessels on adjacent marine waters or airways outside Forest Service jurisdiction affecting the Wilderness solitude, remoteness, and sense of isolation were noted in Tracy Arm – Fords Terror and Misty Fiords Monument.

Evaluation of Results

Generally, standards and guidelines have been effective in preserving the Wilderness character, with the exception of low level of social encounters. These social encounters occur along primary travel ways and areas adjacent to waterways at some locations, such as island edges. Air traffic and cruise ship visitation impacts wildlife, visual quality, remoteness, and solitude. Districts will continue to monitor the effects of disturbance from outside the Wilderness such as aircraft uses, and motorboat uses.

To improve the understanding of Wilderness ethics, an education program is provided in some local communities in the schools, at Visitor Centers and with outfitter/guides. Presently, Interpretive Kayak Rangers have helped with an understanding of Wilderness ethics to visitors of Misty Fiords Wilderness and Tracy Arm through cooperative partnerships with some cruise ship operators. Districts will continue to develop and implement Wilderness education plans.



Wildlife

The Tongass National Forest provides habitat for 54 species of mammals (including introduced elk), 231 species of birds, and 5 species of amphibians and reptiles. There are an additional 18 species of marine mammals found in Southeast Alaska waters that depend almost entirely on the ocean environment, and 45 bird and 3 amphibian species considered casual or accidental visitors to Southeast Alaska. These species provide many opportunities for consumptive and non-consumptive uses, including commercial, sport, and subsistence hunting and photographic and viewing activities. The Forest is rich in its varied and unique species; some of the species found on the Forest in relative abundance (such as bald eagle and brown bear) are threatened or endangered in other parts of the United States.

Goal: Maintain the abundance and distribution of habitats, especially old-growth forests, to sustain viable populations in the planning area. Also, maintain habitat capability sufficient to produce wildlife populations that support the use of wildlife resources for sport, subsistence, and recreational activities.

Objectives: In addition to objectives included in the Biodiversity section, design and implement non-structural wildlife habitat improvement projects to improve an average of 8,000 acres annually across the Forest. Include a young-growth management program to maintain, prolong, and/or improve under story forage production and to increase production of old-growth characteristics in young-growth timber stands for wildlife. Additionally, design and implement an average of 75 structural wildlife habitat improvement projects annually across the Forest.

Background: Since the signing of the 1997 Record of Decision (ROD), we concluded that the list of Management Indicator Species (MIS) needed to be updated and that current Forest Plan wildlife monitoring questions are too broad to develop useful monitoring protocols (DeGayner et al. 1999). The Information Needs section of Forest Plan (Appendix B of the MIS report) and the Administrative Study Information Needs Assessment (ASINA) (Iverson et al. 1998) were particularly useful in selecting a manageable number of MIS and further defining and integrating these monitoring questions.

Wildlife Question 1: Are population trends for Management Indicator Species and their relationship to habitat changes consistent with expectations? (Also see the biodiversity monitoring questions.)

In FY 2001, draft task group reports for key species were developed to aid with funding decisions. Wolf, deer, and marten are included in the current MIS species and flying squirrel and goshawk were investigated as potential MIS species. For more information defining the monitoring questions and a summary of species task group reports, see below and in accompanying data tables in the Appendices. In FY 2001, the USFWS collaborated with the ADF&G to develop a conceptual framework to evaluate the efficacy of wildlife conservation measures in the Tongass Land Management Plan. This ongoing process may influence which species the Forest Service chooses to study and/or monitor in detail and the development of monitoring protocols.

The National Forest Management Act, Code of Federal Regulations prescribes the use of Management Indicator Species (MIS) for monitoring the effects of Forest Service activities on Fish and Wildlife Resources (CFR 36, Part 219.19, also USDA FS, 1982). The intent of these analyses is to develop information useful for Forest Plan amendments and revisions. Consistent with these planning regulations, the Monitoring and Evaluation Plan in the 1997 Tongass Land and Resource Management Plan (Forest Plan; pages 6-15) identifies 13 wildlife MIS and provides monitoring direction for these species. This section fulfills the Forest Plan recommendation for a summary evaluation of MIS distribution, habitat and population trends every 5 years.

A brief summary of the habitats used by the 13 wildlife MIS, population status and trends, and the general management trends on the Tongass National Forest (Tongass) that may influence habitat capability for these species. More detailed summaries of each species is available upon request. In addition, determinations of 1) the relationships that existed between changes in habitat capability and MIS population changes and information on 2) information on the if the habitat and

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population information is consistent with expectations in Forest Plan is also addressed. Various techniques were used to infer trends in habitat capability by assessing changes in important habitats. Each species summary was examined to determine its value of that species as an MIS. This evaluation was based on the quality and quantity of existing data available for that species, the magnitude of the management issues associated with the species, and the cost and feasibility of gathering additional data. For many species we acknowledge that linking population changes to management activities is difficult to implement (Landres et al. 1988, Mladenoff et al. 1997), that our analyses could likely only detect dramatic changes in populations, and that we were unable to definitively determine whether changes in the population was due to human caused habitat change.

Table 2-59. Habitat Requirements and Forest Management Factors that Directly Cause Increased Mortality or Reduce Habitat Capability, and Sources of Population Data for Management Indicator Species (MIS) on the Tongass.

MIS	Habitat Requirements	Factors Causing Increased Mortality or Reduce Habitat Capability	Population Data Sources
Brown Creeper	HVOG [1] - Tall, large diameter trees and decadent timber.	Timber Harvest	BBS [3]; MAPS [4]; CBC [5]
Hairy Woodpecker	HVOG - Tall, large diameter trees w/ plentiful snags and decadent timber	Timber Harvest	BBS; MAPS; CBC
Red-breasted Sapsucker	POG [2]- Open canopy and large decadent trees for nesting	Timber Harvest	BBS; MAPS; CBC
Vancouver Canada Goose	Low elevation – wetlands and forested wetlands	Forest Development	USFWS [6] surveys; BBS, CBC
Bald Eagle	POG - Large trees for nesting and perching near shorelines	Human Access	USFWS surveys; BBS; CBC
River Otter	POG- Forested cover and den sites adjacent to aquatic food resources	Timber Harvest	ADF&G [7] sealing records and Trapper Questionnaires
American Marten	POG- Large trees and abundant canopy cover	Human Access	ADF&G sealing records; ADF&G studies and Trapper Questionnaire
Red Squirrel	Cone producing Sitka spruce stands	Timber Harvest	Backer and Hastings 2002; FSL [8] administrative study; ADF&G/Tongass [9] pellet count transects
Mountain Goat	Steep terrain for escape cover	Timber Harvest Human Access	FS helicopter-goat interaction study; ADF&G Hunter Survey and reports
Black-tailed Deer	As defined in the deer habitat capability model in the 1997 Forest Plan FEIS (low-elevation, south-facing, high volume old growth.)	Timber Harvest	ADF&G [7]/Tongass [9] pellet counts; ADF&G Hunter Surveys
Wolf	Habitat for prey species (e.g. deer)	Timber Harvest [11] Human Access [11]	ADF&G sealing records, POW [12] study, Trapper Questionnaire, and reports
Black Bears	POG and unproductive forest, salmon streams	Timber Harvest Human Access	ADF&G sealing records, research, and reports
Brown Bears	Variety of forested and non-forested habitats. Cover adjacent to salmon streams	Timber Harvest Human Access	ADF&G Hunter Survey, north Tongass population survey, and reports

1) HVOG = High volume old growth defined as TIMTYP volume classes 6 and 7 and volume class 5 that are north and south facing.
2) POG = Productive old growth defined as TIMTYP size class 4. POG refers to VC 4,5,6 and 7.
3) BBS = Breeding Bird Survey.
4) MAPS = Monitoring Avian Productivity and Survivorship.
5) CBC = Christmas Bird Count,
6) USFWS = US Fish and Wildlife Service.
7) ADF&G = Alaska Department of Fish and Game.
8) FSL = US Forest Service Forest Sciences Lab.
9) Tongass = Tongass National Forest.
10) Through reducing habitat capability for black-tailed deer, 11) Indirect impacts through increasing harvest mortality, 12) POW=Prince of Wales Island

Habitat Uses and Trends

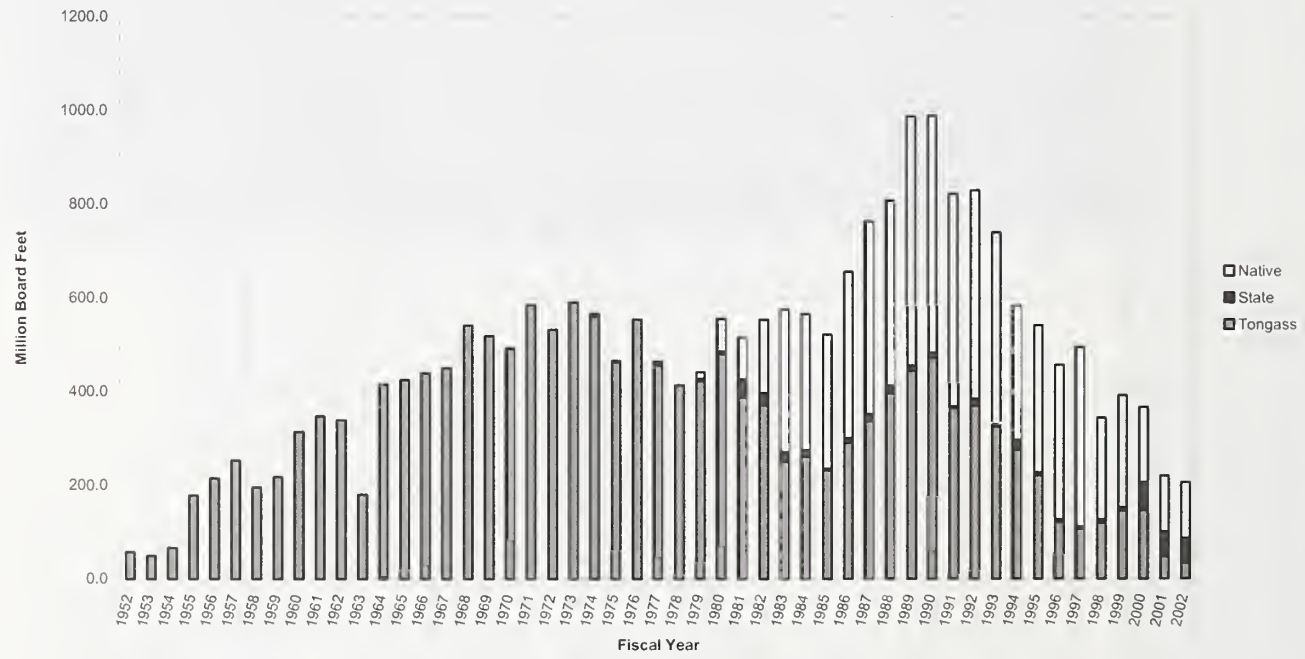
Table 2-59 summarizes habitat quality for the 13 wildlife MIS, factors influencing their mortality rates and habitat capability, and the datasets used to analyze trends in their populations.

One of the main criteria for the initial selection of MIS was whether forest management potentially affects them. In general, species affected by forest management are impacted either by timber harvest directly or indirectly through increased human access provided by roads and/or logging camps. We outline general trends in these two types of habitat changes across the Tongass in Figure 2-5.

Trends in Timber Harvest

Following is a brief history of timber harvesting in Southeast Alaska (SE AK). Large-scale timber harvest began in the early 1950's and peaked in the late 1980's after the signing of ANILCA (Alaska National Interest Land Conservation Act; Figure 2.8). Harvest on privately owned, Native Corporation land was negligible before 1979, but increased rapidly through the mid 1990's and is now declining. Timber harvest on private land has been more concentrated than harvest on the Tongass National Forest in SE Alaska. This is because federal timber harvest came from a base of about 5.5 million acres of productive land, whereas the timber harvest from private lands comes from a base of about 1 million acres. The overall rate of timber harvest in SE Alaska has been decreasing since the early 1990s and the amount of timber harvested on the Tongass in 2002 was the lowest it had been since 1953. However, cumulative effects from the last 50 years of harvest will continue to diminish habitat capability for some MIS as harvest units enter the stem exclusion stage of succession. Stem exclusion stands are poor quality habitat for most MIS because the under story is poorly developed.

Figure 2-7. Alaska Timber Harvest, Sawlog and Utility Totals



Amount (in Million Board Feet) of timber harvested on the Tongass National Forest (Tongass), State, and privately owned Native Corporation lands in Southeast Alaska.

Of the 5.5 million acres of productive old growth on the Tongass National Forest in 1954, about 1.3 million acres are tentatively suitable forested lands (Tongass R.O.D. 1997:7). Of these acres, about ½ million acres are available for timber harvest over the 100-year timber rotation. Assuming maximum levels of allowable timber harvest (267 million board feet/year), this equates to an annual harvest of about 8,250 acres. About 16,472 acres have been harvested on the Tongass during the 5-year period

(1998 through 2002) since implementation of Forest Plan. This amount of harvest equates to about 3294 acres annually, less than half the maximum rate allowed in the Forest Plan. The majority of this harvest occurred in GMUs 2 and 3, particularly in the Central Prince of Wales Volcanics, Wrangell Narrows Meta-sediments, and the Zimovia Strait Complex ecological subsections. The number of acres harvested in the last 5 years equates to a very small percentage, generally < 1%, of the forest in these subsections (Nowacki et al 2001). Therefore, reduction of old growth habitat to date has been less than projected in the Forest Plan Final Environmental Impact Statement (USDA FS 1997).

Table 2-60. Acres of Timber Harvest by Vegetation/Volume Classification Schemes

			Volume Strata							
		Forest Plan	High Strata			Medium Strata			Low	Other
		TIMTYP VOLC	6 and 7	5	5	5	4	4	4	
		Aspect/ hydric		North	South	Hydric	North	South	Hydric	
		Mapping Codes	V67	V5_N	V5_S	V5HY	V4_N	V4_S	V4HY	
GMU	SUBSECTION									
1A	Behm Canal Complex	120	80	0	40	0	0	0	0	0
1A	Bell Island Granitics	862	20	160	261	160	60	120	40	40
1A	Traitors Cove Metasediments	1503	200	180	280	180	20	301	301	40
2	Central POW Till Lowlands	879	280	20	40	100	0	80	260	100
2	Central POW Volcanics	2904	381	220	601	320	200	521	381	280
2	Elevenmile Till Lowlands	161	0	20	0	20	20	60	20	20
2	Hetta Inlet Metasediments	981	200	120	220	0	100	220	40	80
2	North POW-Kuiu Carbonates	901	560	20	301	0	0	20	0	0
2	Skowl Arm Till Lowlands	841	60	0	0	120	20	140	320	180
3	Duncan Canal Till Lowlands	897	20	120	259	60	80	179	160	20
3	Etolin Granitics	40	0	0	40	0	0	0	0	0
3	Kake Volcanics	120	0	0	20	0	0	40	20	40
3	Kuiu-POW Granitics	199	0	40	159	0	0	0	0	0
3	North POW-Kuiu Carbonates	220	100	40	20	0	0	40	0	20
3	Rowan Sediments	480	140	80	200	20	0	0	40	0
3	Stikine Strait Complex	180	20	20	100	0	0	20	0	20
3	Sumner Strait Volcanics	920	40	199	300	0	60	180	40	100
3	Wrangell Narrows Metasediments	1643	201	321	440	0	281	280	60	60
3	Zimovia Strait Complex	1980	0	220	400	60	240	700	200	160
4	North Baranof Complex	501	0	40	40	40	120	140	100	20
4	Peril Strait Granitics	140	0	60	20	20	40	0	0	0
	Tongass Total [1,2]	**16472**	**2302**	**1882**	**3742**	**1101**	**1241**	**3042**	**1981**	**1181**

[1] Forest Database was queried for all timber harvest from 1998 through 2002. The Record of Decision was signed in mid-1997 so some timber harvested in the fall of 1997 is not reflected here.
[2] Caouette J. P and E. J. DeGayner. 2003. A Forest mapping and classification tool developed by modeling tree sizes and densities in the commercial forests of southeast Alaska. In Review and still being tested.

Table 2-60 shows acres of harvested productive old growth[1] as classified in the Forest Plan as High, Medium, and Low volume, the corresponding TIMTYP volume classes (TIMTYP VOLC), and the Caouette/DeGayner Model (CD MODEL). Also listed is whether the stand is facing north or south or whether it has hydric soils (Aspect/Hydric). Period covered is 1998 through 2002. Harvest is also listed by ADF&G game management unit and subunit (GMU) and ecological subsection. Only the subsections with timber harvest during the period above are listed here.

Although the short-term changes in the abundance and quality of MIS habitats due to timber harvest in the last 5 years are small, the long-term cumulative habitat change over the last 50 years is relatively large in some landscapes, for example, 36 percent of Wildlife Analysis Areas (WAA) 1530 has been converted to young growth.

Trends in Road Access

Roads provide improved access for harvest of wildlife species. Improved access can potentially lead to over harvest of species if regulatory measures (e.g. bag limits) are ineffective. In the Forest Plan, the Tongass recognized that wolf, black and brown bears, mountain goat, and American marten populations could be sensitive to improved human access. We recognize that populations of any species subject to harvest could be impacted negatively by increased human access. Therefore, species such as Sitka black-tailed deer and river otter may also suffer increased mortality because of increasing human access in conjunction with management activities.

Table 2-61. Acres of Lands Less Than 1500 ft Elevation that meet Roadless Definition

GMU	Tongass National Forest					State and Private	
	Roadless Acres	Timber Harvest 1998-2002	Miles of Road[1]	Road Density Sq. Miles	Percent Roaded[2]	Total Land	Young Growth[3]
1A	1,566,086	2405	416	0.17	4	160579	19374
1B	615,253	0	136.53	0.14	4	24906	2140
1C	813,504	0	77.99	0.06	2	105058	20512
1D	43,426	0	0.00	0.00	2	499	0
2	1,649,810	5765	2166.84	0.84	21	376773	142322
3	1,514,492	6301	1209.45	0.51	15	135009	29430
4	2,476,080	641	820.22	0.21	6	157270	52293
5	589,339	0	70.97	0.08	3	33295	14108

[1]From update SEIS roads coverage (1/24/2003)
[2]From file /tnf/tlmp/seis/Tong_rdls from SEIS (2003)
[3]From Ecotrust's GIS layer. These data have not been verified.

Table 2-61 displays by GMU the acres of land that meet Wilderness Act definitions for "roadless", the acres of land harvested between 1998 and 2002 on the Tongass National Forest, cumulative timber harvest as evidenced by young growth on private and state lands, and road density. Miles of road alone can be a misleading indicator of the distribution of roads, so the percentage of habitat near roads was summarized.

Table 2-61also shows total acres of land that are Roadless and that were harvested between 1998 and 2002 (Timber Harvest) on the Tongass, miles of road, miles of road per square mile (Road Density), and the Percent Roaded land on the Tongass National Forest by ADF&G game management unit and subunit (GMU). Also listed is the acres of State and Private land (Total Land) and the acres of that land that is currently Young Growth forest representing cumulative timber harvest. All calculations represent lands less than 1500 feet in elevation.

Areas of intensive timber harvest and associated roads are most prevalent in GMUs 2 and 3. This is true on both public and private land. Roads in these GMUs, as well as 4 and 1B, tend to be concentrated in a few Wildlife Analysis Areas, for example, WAA 3525).

The database used by the Tongass N.F. to track the year a road was built and whether a road is open or closed is complete. As a substitute for this information, and to determine trends in human access, we assumed that human access via roads increases in large areas of timber harvest (>750 acres). Based on this assumption, we determined that since implementation of the Forest Plan in 1997 human access has increased in WAAs 510 (GMU 1A); 1422 and 1214 (GMU 2); and 1901, 1902, 5136, and 5012 (GMU3). However, these WAAs were generally heavily roaded before implementation of the Forest Plan. Because our database is currently incomplete we do not know how many of the roads in these timber areas have been closed. Although data do not exist for roads on state and private lands, large numbers of roads are likely to occur with large areas of timber harvest on these lands as well.

Several different ongoing or recent research projects actively monitor effects of roads on key species and these studies are addressed in the individual species summaries below. Site-specific project-level plans devote resources to human-access management to mitigate and/or modify sport/subsistence harvest restrictions. We expect the roads database will be completed soon, and as part of the mid-term review of the Forest Plan, will be used for evaluating the effectiveness of these project-level measures for conserving MIS populations.

Population Trends and Relationship to Habitat Changes

Population status, population trends over time, and their relationship to habitat changes are discussed in more detail in DeGayner et al. (ND). We analyzed the best available population data for each species. In most cases, these data did not indicate strong upward or downward trends in populations. With the exception of wolves and brown bears, all other species were consistent with the expectation of the Forest Plan FEIS; in general, species will decline in proportion to loss of habitat capability. The nature of the data did not allow for determination of causal relationships between changes in habitat quantity and quality and population trends. Monitoring protocols must be revised to improve our understanding of MIS habitat/population relationships. The following are the individual Wildlife MIS species proposals, for which funding was authorized for FY 2002:

Brown Creeper

The requirements of the Forest Plan were met through the compilation of results of CBC, BBS, and MAPS to evaluate brown creeper population trends. However, these datasets reflect only very large changes in the brown creeper population and these protocols were designed to detect changes in avian populations over regions larger than the Tongass. Observer ability and inter-annual detection rates can be used to track changes over extremely large periods of time. Analytical methods have not been developed to deal with the numerous potential biases associated with the CBC data. None of these protocols can relate changes in brown creeper habitat directly to changes in their populations.

Therefore, the best population data currently available for brown creepers is not sufficient to monitor changes in the population on the Tongass. If the brown creeper is maintained as a MIS we suggest designing a monitoring protocol(s) that 1) is more sensitive to population change and 2) enables the forest to determine if changes in the population are due to human-caused habitat change. However, we note that development of an effective monitoring protocol may not be practical because brown creepers have low densities across the forest and are difficult to detect. In addition, an effective protocol may be cost prohibitive to carry out. Therefore, although the habitat requirements of the brown creeper would make it an excellent indicator of trends in HVOG habitat, it may not serve the Tongass well as a MIS for the following reasons.

1) The habitat needs of the brown creeper may be addressed by another species on the current, or revised, list of Tongass MIS.
2) Brown creepers are difficult, and potentially expensive, to monitor.
3) Current methods of monitoring the brown creeper population such as the CBC, BBS, and MAPS require greater resolution for monitoring on the Tongass.
4) If the brown creeper remains as an MIS, new monitoring techniques will need to be developed.
5) If the brown creeper is dropped as an MIS, the Tongass should ensure its habitat needs are represented among the revised list of MIS. This may require designating a different species in the place of brown creepers. Andres (Personal Communication 1998) has suggested that

golden-crowned kinglets may be a suitable substitute. Finally, we note that the US Fish and Wildlife Service is currently studying the efficacy of the 1000-ft beach buffer prescription for conserving forest birds and this presents an opportunity for the Tongass to support the study of bird-habitat relationships.

Hairy Woodpecker

The requirement of the Forest Plan were met through the compilation of results from CBC, BBS, and MAPS and the evaluation of hairy woodpecker population and habitat trends. However, these datasets are deficient for detecting all but very large changes in the population and were designed to detect changes in avian populations over regions larger than the Tongass.

In addition, changes in the hairy woodpecker population can only be detected in large temporal datasets because of variability in observer abilities and inter-annual detection rates. None of these protocols relate changes in hairy woodpecker habitat directly to changes in their populations. Therefore, the best population data currently available for hairy woodpeckers is not sufficient to monitor changes in the population on the Tongass. If the hairy woodpecker is retained as an MIS, we suggest designing a monitoring protocol(s) that 1) is more sensitive to population change and 2) enables the forest to determine if changes in the population are due to human-caused habitat change.

The development of an effective monitoring protocol may not be practical because hairy woodpeckers have low densities across the Forest and are difficult to detect. In addition, an effective protocol may be cost prohibitive to implement. Therefore, although the habitat requirements of the hairy woodpecker would make it an excellent indicator of trends in HVOG habitat, it may not serve the Tongass well as a MIS for the following reasons.

1) The habitat needs of the hairy woodpecker may be addressed by another species on the current, or revised, list of Tongass MIS.
2) Hairy woodpeckers are difficult, and potentially expensive, to monitor.
3) Current methods of monitoring the hairy woodpecker population such as the CBC, BBS, and MAPS require greater resolution for monitoring on the Tongass.
4) If the hairy woodpecker remains as an MIS, new monitoring techniques will need to be developed.
5) The US Fish and Wildlife Service (USFWS) recently proposed the Tongass fund USFWS research and field-testing of effectiveness monitoring protocols for primary cavity nesters in SE AK. In addition, the Tongass may have the opportunity to support USFWS research to evaluate the habitat quality of beach buffers for birds, including the hairy woodpecker.

If the hairy woodpecker is dropped as an MIS, the Tongass should ensure its habitat needs are represented among the revised list of MIS. This may require designating a different species in the place of hairy woodpeckers. Should the hairy woodpecker be retained as a MIS, a different monitoring protocol would have to be established.

This protocol would need to be designed to isolate population changes due to habitat change from population changes caused by weather, disease, or other factors. In addition, a new protocol should consider timing monitoring activities to account for the early breeding season of these birds.

The hairy woodpecker should be retained as a MIS due to habitat requirements and primary cavity excavator role. Hairy woodpecker monitoring protocols need to be designed that better track changes in the population or relate changes in habitat to measurable differences in population parameters. The US Fish and Wildlife Service (USFWS) recently proposed the Tongass fund USFWS research and field-testing of effectiveness monitoring protocols for primary cavity nesters in SE Alaska, including the hairy woodpecker.

If a viable monitoring protocol cannot be developed, then the hairy woodpecker may not serve the Tongass well as a MIS. Should the hairy woodpecker be dropped as an MIS, Tongass should make sure its habitat preferences are still represented among the revised list of MIS, which may require designating a different species in the place of hairy woodpeckers as an MIS.

Red-Breasted Sapsucker

The requirements of the Forest Plan were met through the compilation of results from the CBC, BBS, and MAPS data and the evaluation of red-breasted sapsucker population trends. However, these datasets are deficient for detecting all but very large changes in the red-breasted sapsucker population. As these protocols are currently designed, large temporal datasets are required because of variability in observer abilities and inter-annual detection rates. In addition, these protocols cannot relate changes in red-breasted sapsucker habitat directly to changes in their populations.

The best population data currently available for red-breasted sapsuckers is not sufficient to monitor changes in the population on the Tongass. If the red-breasted sapsucker is retained as a MIS, we suggest designing a monitoring protocol(s) that 1) is more sensitive to population change and 2) enables the Forest to determine if changes in the population are due to human-caused habitat change.

We note that development of an effective monitoring protocol may not be practical. Red-breasted sapsuckers have low densities across the Forest. In addition, an effective protocol may be prohibitively expensive to implement. Therefore, the red-breasted sapsucker may not serve the Tongass well as a MIS for the following reasons.

1) The habitat needs of the red-breasted sapsucker may be addressed by another species on the current, or revised, list of Tongass MIS.
2) Red-breasted sapsuckers are difficult, and perhaps prohibitively expensive, to monitor.
3) Current methods of monitoring red-breasted sapsucker populations such as the CBC, BBS, and MAPS require greater resolution for monitoring on the Tongass.
4) If the red-breasted sapsucker remains an MIS, new monitoring techniques will need to be developed.
5) If the red-breasted sapsucker is dropped as an MIS, the Tongass should ensure its habitat needs are represented among the revised list of MIS. This may require designating a different species in the place of the red-breasted sapsucker.

Vancouver Canada Goose (VCG)

The requirements of Forest Plan were met through the compilation of the best available data to evaluate VCG population and habitat trends. However, these datasets are likely deficient for detecting all but very large changes in the VCG population. In general, these protocols were designed to detect changes in avian populations over regions larger than the Tongass.

In addition, change in populations can only be detected in large temporal datasets because of variability in observer abilities and inter-annual detection rates. Furthermore, analytical methods have not been developed to deal with the numerous potential biases associated with the CBC data. Finally, none of these methods can relate changes in VCG habitat directly to changes in their populations.

Therefore, the best population data currently available for VCG are not sufficient to monitor changes in the population on the Tongass. If the VCG is maintained as a MIS we suggest designing a monitoring protocol(s) that 1) is more sensitive to population change and 2) enables the forest to determine if changes in the population are due to human-caused habitat change.

However, we note that the VCG are not associated with large issues about habitat degradation because their habitats are generally low quality for timber production. Therefore, the VCG may not serve the Tongass well as a MIS.

Bald Eagle

As directed by the Forest Plan monitoring and evaluation plan, the results of the CBC, BBS, and USFWS aerial surveys to evaluate bald eagle population trends were compiled. The use of CBC and BBS datasets to detect changes in bald eagle populations is likely not appropriate because these protocols were designed for larger scales than SE Alaska. However, aerial surveys conducted by the USFWS appear to provide credible population data. In addition, these surveys have proven effective

for monitoring bald eagle population trends. Of all the MIS, we know the most about bald eagle populations.

For this reason, bald eagle demographics may be a logical measure of the efficacy of the 1000-ft beach buffer prescription. Therefore, the bald eagle may be an effective MIS. The Tongass has contributed in-kind support to the USFWS for their aerial survey work. In addition, the USFWS is currently studying the efficacy of the 1000-ft beach buffer prescription for conserving forest birds and this presents an opportunity for the Tongass to support the study of bird-habitat relationships.

River Otter

As directed by the 1997 Forest Plan monitoring evaluation plan, the best available data on river otter habitats and populations was evaluated. The river otter may not serve well as a MIS because these protocols reflect only the very large changes in the river otter population.

To improve information on the river otter, a new monitoring protocol would need to be developed that 1) is more sensitive to population change and 2) is designed to detect changes in population due to human caused habitat change. The development of this protocol(s) may not be practical because river otters do not lend themselves well to established mark/re-sight monitoring methods and an effective monitoring protocol may be costly to carry out.

Under the current Forest Plan, otters are not associated with large issues about habitat degradation. This is because the current beach/estuary and riparian standards and guidelines appear to protect their habitats.

Current indirect methods of monitoring otter populations, such as trapping harvest data require further refinement and resolution for the purposes of mentoring on the Tongass. River otter populations are difficult and expensive to monitor. If the river otter remains an MIS, new monitoring techniques will need to be developed.

American Marten

As directed by the 1997 Forest Plan monitoring and evaluation plan, the results were compiled from the best available data to evaluate trends in marten populations and habitats. Although the sealing data were not designed to track changes in the marten population, these data appeared to be a good index. The qualitative data gained from trapper surveys was not useful in detecting small changes in the marten population over short time intervals. Both datasets were lacking in information needed to relating changes in marten populations to changes in their habitat.

Marten habitat requirements were influential in the spacing, composition, and size of old growth reserves in the 1997 Forest Plan. In addition, specific standards and guidelines were adopted to provide for some habitat needs in certain provinces. Since marten are thought to be sensitive to forest management and there are significant information needs about their biology; the marten is a logical MIS. This information would be useful in evaluating whether the old growth conservation strategy is effective and warranted.

Retaining the marten as a MIS would require designing a marten monitoring protocol(s) that 1) is more sensitive to population change and 2) more likely to link changes in the population with habitat change. Ongoing work by the ADF&G and USFWS will improve our understanding of marten habitat relationships and marten densities across the Tongass and could be built upon as part of a monitoring protocol.

Red Squirrel

As directed by the 1997 Tongass Land and Resource Management Plan (Forest Plan) monitoring and evaluation plan, the best available data on red squirrel habitats and populations was collected and assessed. The current monitoring protocol as described in the Forest Plan is not adequate for detecting changes in the red squirrel population due to forest management.

These data could likely only detect a very large change in the red squirrel population. Only a small subset of the deer transects are surveyed each year and many years may pass before they are surveyed again. This protocol was not designed specifically to track changes in the red squirrel

populations. Rather, the design is driven by information needs for deer. Unpublished data from Bakker indicate that surveys based on detecting red squirrel vocalizations may be biased due to behavioral differences among red squirrels in different habitats. Smith's density data (unpublished data) support this finding.

The methodology cannot be used to monitor changes in red squirrel populations due to changes in their habitat. Lastly, the data collected could only be used as an index for population change. Red squirrel density cannot be calculated with these data because the distance to red squirrels detected is not estimated.

Therefore, to improve information on red squirrels, a new red squirrel monitoring protocol(s) would need to be developed that 1) provides a sampling design specific for enumerating squirrel populations, 2) is more sensitive to population change and 3) enables the Tongass to determine if changes in the population are due to human caused habitat change. Development of an effective monitoring protocol may not be practical, however, because the expense of the mark/re-sight methodology may prohibit wide scale implementation. We have learned that with current monitoring protocols, the red squirrel may not serve the Tongass well as a MIS for the following reasons:

1) Current Forest Plan conservation strategies are considered effective for the management of this species.
2) Red squirrels are difficult to monitor. Surveys in conjunction with deer pellet counts will not meet Tongass monitoring objectives. New monitoring techniques need to be developed and may be prohibitively expensive.
3) Information needs associated with the red squirrel are not as pressing as those for other MIS. Given limited resources, monitoring efforts may be better spent on MIS that were much more influential in the design of conservation measures in Forest Plan (e.g. marten or wolves).

Mountain Goats

As directed by the Forest Plan monitoring and evaluation plan, the best available data on mountain goat habitat and populations was summarized. However, these data reflect only relatively large changes in mountain goat populations.

The overall mountain goat habitat changes have been small and these data are not sufficient to detect the small changes in the mountain goat population that would be predicted in the Forest Plan Final Environmental Impact Statement (FEIS).

Problems with the use of harvest data for tracking population changes are likely because these data are not collected to track population changes. Rather, the data reflect mountain goat harvest and can be used to develop information on hunter demographics and behaviors. The data cannot be used to determine if habitat change is the cause of population change. To do so would require a designed experiment.

Goat populations in SE Alaska currently are monitored via ADF&G aerial surveys and harvest records. This information is important to the Tongass, since they may detect large changes in populations. If concerns about these populations are elevated; additional monitoring, changes in hunting regulations, or changes in access could be implemented.

If additional monitoring is needed, an improved protocol(s) would need to be developed that 1) is more sensitive to population change and 2) that can determine if changes in the population are due to human caused habitat change. Given limited resources and other competing issues, the development of a more sophisticated monitoring protocol may not be practical, however, because it will likely be prohibitively expensive. Therefore, given the information collected and discussed above, we conclude that the mountain goat may not serve the Tongass well as a MIS for the following reasons.

1) Current Forest Plan conservation strategies are generally thought to be effective for the management of this species. The effects of helicopter noise issues on goat behavior are being explored in a Regional administrative study.
2) Mountain goats are difficult to monitor due to forest cover, terrain, and weather.

3) Existing ADF&G harvest and survey data are too coarse to meet Tongass monitoring objectives (i.e. link habitat changes to population changes). Improved monitoring techniques will need to be developed.
4) Whether or not the mountain goat remains a MIS, the opportunities exist for supporting existing ADF&G goat surveys and joint research on the effects of increased flight seeing on goats. Lastly, human activities and access should be integrated into cumulative effects and habitat analyses for mountain goats.

Sitka Black-tailed Deer

As directed by the Forest Plan monitoring and evaluation plan, the best available deer population and habitat information was reviewed for trends. The ADF&G has cautioned the FS on the utility of using the current pellet data for monitoring purposes. Therefore, we have avoided this analysis, with the exception of citing ADF&G's analysis for GMU 2. We have detected a decline in habitat capability.

The existing population indices may be lacking in the detection of all but very large changes in the deer population. The harvest survey data were not designed to track changes in the deer population. The data reflect deer harvest, and can be used to develop information on hunter demographics and behaviors. How deer populations respond to changes in their habitat is not addressed by the data. To the extent possible, "cause and effect" determinations would require a controlled, randomized, and replicated design.

If deer are retained as an MIS, the efficacy of current monitoring techniques should be examined, and new protocols should be developed. The developed protocols should be 1) sensitive to population change, 2) enable the forest to determine if changes in the population are due to human caused habitat change, and 3) test and verify the underlying assumptions of the 1997 Forest Plan FEIS deer model.

The Tongass and ADF&G are in the fourth year of a deer-predator-habitat interaction study. Through the development of models, this study will enhance Tongass understanding of the effects of forest management on deer populations. It is expected that this model will be operational for the next Forest Plan Revision. In addition, there are opportunities to further develop the deer habitat capability model.

Grey Wolf

As directed by the Forest Plan monitoring and evaluation plan, the best available data on wolf habitat and populations was evaluated. The data available for wolf monitoring are applicable to only very large changes in the wolf population.

The sealing data were not designed to track changes in the wolf population, but reflects wolf harvest and can be used to track information on hunter demographics and behaviors. In addition, the sealing data lack information on the efforts of unsuccessful trappers/hunters, which can significantly increase the value of a catch per unit effort index when trapper/hunter success is low.

The data cannot be used to monitor changes in wolf populations due to changes in their habitat. Therefore, because overall habitat changes (and prey population changes) have been small, the best data currently available on wolf populations is not sufficient to detect the small changes in wolf population predicted.

Since wolves were important in the design of conservation measures in the Forest Plan, they are a logical MIS. To improve information on wolves, the ADF&G and Tongass N.F. have conducted and published conservation assessment (Person et al, 1996) and have begun a new research project to allow managers to better monitor deer population-habitat-wolf population interactions.

Other than the use of models, development of an effective Forest-wide monitoring protocol may not be practical, however, because the expense of the mark/re-sight methodology may prohibit wide scale implementation.

Black Bear

As directed by the Forest Plan monitoring and evaluation plan, the best available data on bear habitat and populations was evaluated. However, these data can likely only detect large changes in black bear populations.

Overall black bear habitat changes have been small, therefore, the dataset is likely not sufficient to detect the small changes in the black bear population that would be predicted in the Forest Plan Final Environmental Impact Statement (FEIS).

Problems with our use of sealing data for tracking population changes are likely because these data are not collected to track population changes, but reflect black bear harvest and information on hunter demographics and behaviors. This dataset lacks information on the efforts of unsuccessful hunters, which, if known, can significantly increase the value of a days/successful hunt index. Sealing data cannot be used to determine if habitat change is the cause of population change. To do so would require a designed experiment.

To improve information on black bears, a new black bear monitoring protocol(s) should be developed that 1) is more sensitive to population change and 2) that can determine if changes in the population are due to human caused habitat change. Development of an effective monitoring protocol may not be practical due prohibitive costs.

The expense of the mark/re-sight methodology currently under development will likely prohibit its wide scale implementation. Therefore, we conclude that, from this exercise we have learned that, the black bear may not serve the Tongass well as a MIS for the following reasons.

1) Black bear populations are difficult to monitor.
2) ADF&G sealing data require greater resolution for monitoring on the Tongass.
3) If the black bear remains as an MIS, new monitoring techniques will need to be developed.
4) An adequate monitoring program is likely to be prohibitively expensive to implement.
5) The habitat needs of the black bear may be addressed by another species on the current list of Tongass MIS.
6) If the black bear is dropped as an MIS, the Tongass should ensure its habitat needs are represented among the revised list of MIS. This may require designating a different species in the place of black bears. The current MIS list has several species with overlapping habitat needs, most notably brown bears.
7) Furthermore, given their intolerance of human contact and their avoidance of clearcut and second growth habitat, brown bears are associated with more management concerns than are black bears.

Brown Bear

As directed by the Forest Plan monitoring and evaluation plan, we have compiled the best available information from all sources to evaluate trends in brown bear population and habitat. However, the population datasets are deficient for detecting all but very large changes in the brown bear population.

The sealing data and hunter questionnaire were not designed to track changes in the brown bear population. Rather they track brown bear harvest and develop information on hunter demographics and behaviors. In addition, these data cannot be used to monitor changes in brown bear populations due to changes in their habitat. For these reasons, these data are not sufficient for monitoring brown bears on the Tongass.

The brown bear may be an effective MIS if protocols are developed that are sensitive to small changes in the population and that can relate those changes to trends in forest management.

The ADF&G currently monitors brown bears using a published protocol on heavily developed northeast Chichagof Island. This area has high levels of road access and is connected to the community of Hoonah. ADF&G also monitor bear populations on less developed north Admiralty Island. This project appears to be a credible method for monitoring bears and the effects of forest management on populations. Results of these monitoring efforts on the Chichagof portion of the study

area in FY2002 are expected soon. In addition, opportunities exist to support brown bear population and habitat studies in other locations within GMU 4.

We also note that information on brown bear populations and habitat is an important part of evaluating the efficacy of the 1997 Forest Plan. This is because the habitat needs of brown bears were influential in the size, spacing, and composition of old growth reserves and the development of some Forest Plan standards and guidelines.

Recommendations for FY 2003

1) Continue to participate in the interagency development of a conceptual framework for monitoring, including developing new monitoring protocols.

2) Complete update and refine draft species task group reports developed in FY 2002 and 2003 for distribution.

3) Since we are about five years into the Tongass Land Management Plan, continue to summarize the trends in habitats and populations for MIS and proposed MIS as directed in the Forest Plan, and review and entertain proposals for updating Standards and Guidelines for effectiveness.

Wildlife Question 2: Are the population levels and associated distribution of mammalian endemic species on islands and portions of the mainland consistent with the estimates in the Forest Plan?

According to the Forest Plan Monitoring and Evaluation Guidebook, this question is answered through an annual report on the progress of the small mammal study specified in the Information Needs section of the Forest Plan (Appendix B-2, Forest Plan). There are no estimates of distribution of small mammal endemics in the Forest Plan. This study continued through the year 2002.

Researchers have made headway in documenting endemic[1] species in SE Alaska for a decade and have only sampled a small proportion of the Alexander Archipelago and mainland. Those islands sampled were studied along the shoreline or where logging roads provided access inland.

More sampling and genetic analyses of specimens are required on smaller, near shore islands. Further study of the flying squirrel populations is required to determine if the Prince of Wales data is representative of the rest of the Forest. Current distribution and densities of flying squirrels on Mitkof Island may indicate that Prince of Wales Island data may not be as representative of all Old Growth Reserve populations, and therefore should not be used as a yardstick against the Forest Plan.

Monitoring Results

The dynamic geological history and naturally fragmented landscapes of SE Alaska create an environment with a high potential for endemism. The challenges of managing forest resources are intensified within island archipelagos because of the increased sensitivity of indigenous biota to disturbance and higher rates of extinction, especially among endemic species. Early expeditions of the large islands of the Alexander Archipelago (≈1% of all named islands) documented 27 endemic mammalian taxa.

More recent studies with modern techniques found that: 1) some reputed endemics showed nominal levels of genetic divergence from other populations of the same species; 2) more divergence existed among some taxa than was reflected in the current taxonomy; and 3) the mammal fauna of SE Alaska has a nested structure with complex geographic patterns suggesting multiple colonization events. Unlike most oceanic archipelagos, the nested mammal fauna of the Alexander Archipelago apparently resulted from differential colonization.

Evaluation Of Results

Of eight taxa examined through detailed geographic analyses, five species showed acute genetic variation and divergence in mitochondrial sequences. Four species (dusky shrew, long-tailed vole, American marten, and black bear) were comprised of coastal and continental clades[2], whereas ermine showed a third clade (Beringia).

Conversely, the northern flying squirrel and southern red-backed vole were represented by relatively shallow divergent lineages. Still, the northern flying squirrel showed a distinct mitochondrial lineage on eleven islands (Prince of Wales Island complex), which exhibited severely reduced genetic variation. Recent ecological studies of endemic populations of northern flying squirrel and southern red-backed voles provide the first quantitative estimates of habitat distribution, demography, and ecological correlates of abundance in SE Alaska.

The risk of extirpation in managed landscapes is likely less for both reputed old-growth associates than was assumed during the recent revision of the Tongass Land Management Plan because abundant noncommercial forests apparently contribute to breeding populations of flying squirrels, and red-backed vole populations may be able to persist in managed second growth stands (Smith Draft).

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[1] A species is defined as endemic when it is native or confined to a certain region; having a comparatively restricted distribution.

[2] A clade is a group of organisms, which includes the most recent common ancestor of all of its members and all of the descendants of that most recent common ancestor (from the Greek word "klados" meaning branch or twig).

The Tongass Land Management Plan changed the managed environments by protecting many sensitive habitats, such as riparian and beach fringe forests, and setting aside large conservation areas from timber harvest (Hanley et. al. in Press).

Still, there are important questions for both species regarding the influence of annual population fluctuations on habitat distribution, stand and landscape features that restrict dispersal, and vegetative and structural characteristics of second-growth stands that will sustain breeding populations of both species.

Costs and Outputs

Costs and Outputs Question 1: What outputs were produced in the previous year?

Monitoring Results

This output information was obtained from the final FY 2002 Management Attainment Report, which was submitted to the Regional Office in October 2002, and Silviculture, Lands, Timber and Roads Resources. Additional information was obtained from the Annual Reforestation and Timber Stand Improvement Report.

Table 2-62. Outputs

RESOURCE	FY2001	FY2002	TYPE
Land Management Plan and Draft SEIS			
Monitoring and Evaluation Report	1	1	Report
Ecosystem Management			
Stream Surveys	129	65	Miles
Lake Surveys	17,900	69,320	Acres
Terrestrial Ecological Inventories (eco-subregion)	250,000	1,250	Acres
Terrestrial Ecological Inventories (land unit)	0	0	Acres
Water Resource Monitoring	16	8	Sites
Recreation Use Monitoring	0	0	Days
Vegetation Inventory (eco-subregion)	15,000	1,705	Acres x 1000
Heritage Resource Inventories	10,600	4,000	Acres
Recreation, Wilderness and Heritage			
Seasonal Capacity	2.37	0.97	MM PAOT Days
Special Use Permit Administration	597	185	Permits
Annual Wilderness and Leave No Trace Education	44,000	0	Contacts
Wilderness Meeting Forest Plan Standards for			
Physical and Social Conditions	5,788	0	Acres
Sites Preserved and Protected	122	160	Sites
Sites Evaluated	35	30	Sites
Sites Interpreted	17	22	Sites
Wildlife Management			
Terrestrial Wildlife Habitat Restored or Enhanced	479	525	Acres
Fisheries Management			
Inland Fish Streams Restored or Enhanced	13	3	Miles
Inland Fish Lakes Restored or Enhanced	67	0	Acres
Anadromous Fish Streams Restored or Enhanced	3	3	Miles
Anadromous Fish Lakes Restored or Enhanced	4,193	4,769	Acres
Threatened and Endangered Species Management			
Number of Sensitive Species for Which Conservation			
Actions were Accomplished	2	0	Species
Range Management			
Noxious Weeds Treated	11	3	Acres
Timber and Forest Vegetation Management			
Timber Volume Offered	67.9	70.3	MMBF
Timber Volume Sold	49.6	24.4	MMBF
Timber Volume Harvested	47.8	33.8	MMBF
Forestlands Maintained or Enhanced by Stand Improvement	4,715	4,738	Acres
Lands Restored by Reforestation	4,395	2,910	Acres

Table 2-62. Outputs, continued

Soil and Water Management			
Soil and Water Resource Improvements	850	404	Acres
Minerals Management			
Abandoned Mine Land Sites Reclaimed	5	0	Sites
Bonded and Non-bonded Non-energy Operations Processed	93	15	Operations
Bonded and Non-bonded Non-energy Operations Administered to Standard	4	3	Sites
Land Management			
Rights-of-Way Acquired	3	0	Cases
Special Use Applications Processed	97	53	Permits
Special Use Permits Administered to Standard	301	233	Permits
Land Classification	20	16	Cases
New Boundary marked to Standard	38	10.5	Miles
Special Area Boundary Location	0	0	Miles
Road, Trail, Dam and Bridge Management			
Road Construction/Reconstruction	69.8	62.8	Miles
Road Bridge Construction	4	21*	Bridges
Access Improvement (Deferred Maintenance)	28.4	79.4	Miles
Annual Road Maintenance	1,186	1,480**	Miles
Roads Decommissioned	0	13.2***	Miles
Bridges Inspected as Scheduled	35	84.7%	Percent
Dams Inspected as Scheduled			Percent
Trails Construction/Reconstruction	2.1		Miles

*Also, 9 bridges were repaired or replaced to change status from Deficient to Obsolete
**Miles of Road maintained to Objective Maintenance Level (OML)
***9.2 Miles of Stream Road and 4.0 Miles of Unclassified Road

Costs and Outputs Question 2: Are the costs associated with carrying out the planned management prescriptions (including those of producing outputs) consistent with those costs estimated in the Forest Plan?

Monitoring Results

The FY 2001 allocation and expenditure amounts were obtained from the September 2001 fund control report. The FY2002 allocation and expenditure amounts were obtained from the September 2002 fund control report.

It is difficult to make a comparison on the expenditures with FY 2002 vs. prior four years. FY 2000 was the first year that the Tongass had all accounting and dollar allocations under one region/unit (1005) combination. Prior to that, dollars and expenditures were in three region/units (1002, 1003, 1005) and not all of the information is available to make the comparison; also FY2001 and FY2002 had large amounts of fire suppression funds withdrawn, which would skew the comparison.

Table 2-63. Outputs based on Allocations and Expenditures

EBLI	Description	Allocated FY 2001 Budget	Spent FY 2001	Allocated FY 2002 Budget	Spent FY 2002
NFIM	Ecosystem Planning/Inventory/Monitoring	3,913,600	2,613,940	3,491,671	3,040,030
NFMP	Land/Resource Management Planning/Inventory/Monitoring	392,500	392,106	0	0
NFPN	Land management Planning	426,700	387,644	1,783,299	1,611,883
NFMG	Minerals and Geology	955,400	705,669	990,390	868,666
NFLM	Land Ownership	2,694,100	1,739,836	2,458,425	2,160,183
NFLE	Law Enforcement	328,300	307,717	356,781	313,025
NFTM	Timber Management	31,072,000	21,192,221	21,732,979	17,923,470
NFRW	Recreation/Heritage/Wilderness Mgmt	5,975,100	5,972,085	5,772,753	5,643,094
NFWF	Wildlife and Fish Habitat	6,818,900	5,300,072	6,393,502	6,229,024
NFVW	Vegetation and Watershed	3,893,850	3,195,273	3,920,209	3,931,446
NFGA	General Administration	0	0	0	0
SMSM	Subsistence Management	2,403,300	2,197,393	2,345,578	2,374,764
WFPR	Fire Management/Suppression	718,000	515,423	833,300	755,146
CMC2	Fire Facilities Construction	194,500	157,226	37,274	30,830
CMFC	Facilities	8,191,328	6,837,460	7,412,638	6,664,177
CMRD	Roads	14,854,792	13,180,325	15,388,283	15,039,240
CMTL	Trail Construction	4,172,229	2,658,053	2,456,102	1,984,040
Total		**87,004,599**	**67,352,443**	**75,373,184**	**68,569,019**
CWKV	KV	784,100	631,838	558,226	475,303
SSSS	Salvage Sale	0	2,373	4,800	5,136
Total		**784,100**	**634,211**	**563,026**	**480,438**

CHAPTER 3
ACTION PLANS

Introduction

Chapter 3 is comprised of a summary of the USDA Forest Service Strategic Plan (2000 Revision) goals and how the action plans contained in Chapter 2 have established mileposts for meeting those goals. The goals and the objectives of the Strategic Plan were developed to guide future agency actions. The four goals are:

Goal 1: Ecosystem Health,

Goal 2: Multiple Benefits to People,

Goal 3: Scientific and Technical Assistance, and

Goal 4: Effective Public Service.

The desired conditions as defined in the Tongass National Forest Land and Resource Management Plan are shown in Table 1 in Chapter 1 of this monitoring report.

A crosswalk table showing the relationship of the monitoring questions defined in the Tongass National Forest Land and Resource Management Plan and the USDA Forest Service Strategic Plan (2000 Revision) goals is shown in Chapter 1 as well. A table excerpt from the USDA Forest Service Strategic Plan, also included in Chapter 1, illustrates the specific goals and the associated objectives of the Strategic Plan.

The following summarizes the action plans that reveal the mileposts attained to orient the Forest toward the goals in FY 2002.

Goal 1: Ecosystem Health (Objective 1.a)

Promote ecosystem health and conservation using a collaborative approach to sustain the Nation's Forests, grasslands and watersheds.

- **Objective 1.a—Improve and protect watershed conditions to provide the water quality and quantity and the soil productivity necessary to support ecological functions and intended beneficial water uses.**
- Objective 1.b—Provide ecological conditions to sustain viable populations of native and desired nonnative species and to achieve objectives for Management Indicator Species (MIS)/focal species.
- Objective 1.c—Increase the amount of forests and grasslands restored to or maintained in a healthy condition with reduced risk and damage from fires, insects and diseases, and invasive species.

The Forest's ecosystem health is reflected primarily in the answers to the monitoring questions on implementation and effectiveness associated with air quality, biodiversity, fish habitat, karst and caves, minerals and geology, recreation and tourism, soil and water, transportation, wetlands, and wildlife, and the standards and guidelines associated with these forest resources.

Fish Habitat, Soil and Water, Wetlands:

Water quality relative to riparian area designation and protection

Water quality relative to buffer zone design and layout

Water quality relative to stream channel protection

Water quality and quantity relative to fish passage

Water quality relative to turbidity, sediment transport, and temperature

Water quality relative to buffer stability and buffer effectiveness

Soil productivity relative to disturbance

Soil productivity relative to erosion

Wetland quality and productivity

Air Quality, Karst and Caves, Minerals and Geology:

Air quality relative to State and Federal standards

Karst and cave resources relative to water quality

Minerals and geology relative to water quality

Recreation and Transportation:

Recreational off-road vehicle effects on soil productivity and water quality

Roads and log transfer effects on soil productivity and water quality

Fish Habitat, Soil and Water, Wetlands

Best Management Practice Implementation Monitoring

Considering recent trends in implementation of these Best Management Practices, these BMPs were applied more frequently and implemented more successfully each successive year since 1997. This increase in application of the BMPs in timber units may be partially due to the specific location of the harvest units relative to the streams. The increase may be partially attributed to an increased emphasis on stream identification and prescription.

In FY 2002, significantly less harvest occurred due to the court injunction that temporarily halted work on the Tongass. Roughly 18% of units were processed through the final acceptance for timber harvest in FY 2002 as compared to the number in FY 2001. Respectively, less than half the number of units was final accepted in 2001 as compared to 2000. Little road construction and reconstruction occurred in FY 2002 due to the limited timber harvest completed and delay in starting the construction season associated with the court decision. The specific road construction work completed on the Tongass was culvert replacements on Class I and II streams.

Unification of the Tongass, and a more standardized monitoring strategy coupled with training, has contributed to increase the knowledge of the BMPs and implementation monitoring. The 2002 monitoring strategy was the same as the one used in 2001. The only exception was the IDT monitoring was completed on all units that were available and accessible. The IDT group worked individually with district staff, soil specialists, timber sale administrators, yarding system specialists, and construction contract administrators. The same numerical rating attribute form was used in FY 2001 to facilitate review and improve consistency. These changes seemed to work well in the monitoring process. We intend to utilize the same monitoring forms that include the numerical rating attribute in FY2003.

Emphasis needs to continue on correctly identifying streams during the site investigation and layout phases of timber harvest unit preparation. The sale area maps and unit cards need to correctly depict the field situations and prescriptions need to be accurate. Action on this emphasis will be completed during the early stages of timber sale preparation.

Continued emphasis will be placed on site-specific designs for culvert replacements, steep gradient channels, channels with turbulent flow, and shallow bedrock. Specific site investigation and stream simulation design techniques are recommended for complex or non-standard sites. There is concern about seeding bare soil on slopes where initial germination rates were low. In response to this concern, site-specific corrective action plans are being developed to provide seeding mixes that minimize erosion potential. In FY 2001 and 2002, stream installations were prioritized through an identification matrix that outlined the prescriptions relative to habitat and barriers. In FY 2001, action was initiated to improve the site investigation and design process.

The stream simulation methodology is being used to design culvert and arch pipe installations that will start to be installed in FY 2002 and continued in 2003. Significant emphasis is needed on application of the turbidity measurement protocols. These protocols will be expanded to address sites where de-watering occurs.

Emphasis associated with soil disturbance and minimizing erosion will continue. These efforts will focus on seeding temporary and specified roads, ensuring water bars are functional, and avoidance and mitigation associated with soil ruts from shovel logging. During the completion of the roads and post haul maintenance; continued emphasis will be placed on the BMPs. Efforts will be taken to ensure adequate numbers and spacing of cross drainage ditches and water bars to minimize surface erosion and sedimentation,

The Best Management Practices are being successfully implemented on the Tongass National Forest. Training and communication needs to continue to emphasize the protection of wetlands, productivity of soil and maintenance of water quality.

Wetland implementation will continue to be conducted as in the past 5 years, where 100% of all units and roads are monitored for implementation of BMP 12.5, as well as implementation of avoidance and minimization requirements set for by Executive Order 11990, as amended (42 U.S.C. 4321 et. Seq).

Relative to evaluation of Bridge/ Culvert Design, Installation and Removal (BMP14.17), evaluation of whether the current implementation monitoring is detailed and specific enough to address fish passage is recommended. This would probably involve a task group assigned to review the current content, approach and evaluation criteria for monitoring the implementation of Forest Plan fish passage standards and guidelines. The task group proposed would include resource specialists and engineers. In the proposed scheme, a task group would consult with the Interagency Monitoring and Evaluation Group (IMEG) and upon acceptance be developed into a protocol.

Soil Disturbance Effectiveness Monitoring

Reviewing the soil disturbance data, the soil scientists recommend no further study nor monitoring of soil disturbance transects. The timber harvest practices and standards and guidelines are providing adequate protection for the soil resources.

The landslide inventory pilot initiated in FY 2001 continues and landslides are being identified, delineated, and digitized. The inventory incorporates the existing project level inventories as well as older forest-wide inventories conducted by the Forest Science Laboratory. Existing data will be verified and digitized. Through application of GIS, evaluation of this data will provide information on mass wasting relative to landform, bedrock lithology, elevation, aspect, soil type, and vegetation type as well as management actions. Data update and stewardship are integral parts of the inventory data base strategy.

Water Effectiveness Monitoring

1. Fish Passage/ Turbidity Monitoring
2. Stream Temperatures/ Buffer Effectiveness/ Stream Buffer Stability
3. Other Aquatic, Riparian, Watershed Attributes

Fish Passage and Turbidity

The knowledge and tools to access water quality and quantity relative to fish passage are evolving. The fish passage analysis model currently is based upon assumptions on stream hydrology, culvert hydraulics, fish swimming abilities, and fish migration needs. These assumptions need to be tested for verification and against the Forest Plan fish passage criteria. Comparison between the model criteria and the fish passage criteria included in the Coastal Zone Management Act, Clean Water Act, and memorandum of understanding between the Tongass and the Alaska State Fish & Game may be revisited considering the changes in the Departments of Fish and Game and Natural Resources.

Work on testing these assumptions and better defining the criteria used in the model is under progress. Expanded application of the model has been initiated and additional data will be available next fiscal year. In an effort to learn additional information about resident fish migration, an administrative study was initiated in fiscal year 2001. This study will investigate the migratory behavior of Dolly Varden char and cutthroat trout in headwaters. Information concerning the relationship between fish movement to time of year, stream stage and size of fish is anticipated. Upon completion of this study, the fish passage analysis model and additional field trials, we intend to modify our design flow standards for culverts to provide unimpeded passage for these species as required.

Evaluation of the supplemental assessment on fish passage capability status of drainage structures shows that additional work on the assessment criteria and completion of the survey is needed. This assessment provides a baseline of current but preliminary fish passage conditions that can be used to assess the status of fish migration through culvert and bridge structures. This information will be used to track the commitment and progress toward maintaining, restoring or improving opportunities for fish migration. Subsequent work to develop and implement action plans for culvert replacement or modification at sites identified as potentially limiting fish passage will continue.

There is currently an initiative toward maintaining, restoring and improving fish passage along Tongass National Forest roads. The initial inventory and survey of all fish streams and their fish passage conditions along Tongass National Forest roads is nearing completion. Through the cooperation of an interagency group, a state-of-the-art fish passage assessment model has been developed and is being continuously improved.

Recommendations follow that monitoring of hydraulic and structural conditions continue at culverts recently installed (i.e., designed and installed under the direction of the current Forest Plan) in fish bearing streams. This monitoring effort is necessary to assess the achievement of fish passage and will assist in the evaluation of the success of design, maintenance and other management actions. Monitoring the structural and hydraulic conditions of new culverts installed in fish bearing streams is especially important as the Forest applies innovative design concepts and criteria in its aggressive program to restore and improve fish passage.

Proposals include development of a task group to review the current content, approach and evaluation criteria for monitoring the effectiveness of Forest Plan fish passage standards and guidelines. The task group would consult with the Interagency Monitoring and Evaluation Group (IMEG) and may recommend changes to the Monitoring and Evaluation Plan contained in the Forest Plan. Issues for discussion include: 1) Refining effectiveness monitoring objectives and protocol. 2) Providing better integration of fish passage implementation and effectiveness monitoring. 3) Improving the process for the identification and reporting of drainage structures installed or reinstalled in fish streams on an annual basis so effectiveness monitoring sample populations can be better defined. 4) Relating contract as built drawings to record baseline conditions to provide for improved follow-up effectiveness monitoring.

It is also recommended that effort continue toward the evaluation of the models and assumptions used in the assessment of fish passage effectiveness. This includes continuation of a study assessing the movement patterns of headwater populations of Dolly Varden char and cutthroat trout. This study will provide a better understanding of the stream flow conditions and season that these fish naturally move during. This information will allow culverts to be designed appropriately. Work should also continue on evaluating the assumptions contained in the Juvenile Fish Passage Evaluation Criteria Matrix.

Improved standards for drainage structure design in fish streams are recommended. Study plans to better understand fish migration needs are being drafted. There is currently substantial funding available to correct fish passage problems identified through the survey and analysis process. In FY 2003, survey, design and construction of several structures to improve fish passage is planned. The tentative list of work is included in Appendix C. The following actions are recommended for fish pass construction in relation to turbidity issues in 2003.

1. The construction and monitoring of dewatering structures and in stream work on a continual basis with careful documentation is necessary. Monitoring and documentation of intermittent construction starts and stops is necessary. Efforts to reduce fines in the material placed in the streams needs to be emphasized.

2. Ensure de-watering structures are placed appropriately to minimize sediment reentry into the stream course and the passage of the water through a filtering mechanism.

The water quality effectiveness monitoring for turbidity was emphasized in FY 2002. Sampling episodes were more consistent and data was collected from timber sale as well as fish passage projects. This data was compared to the State Water Quality Standards to evaluate compliance within the Standards following the 48-hour temporal variance period. In FY 2003, a hydraulic engineer will be assigned with oversight responsibilities on the monitoring as well as Tongass-wide training on turbidity monitoring.

The following specific actions are recommended for turbidity monitoring in FY2003:

1. Consider adjusting sampling strategy to use random and/or stratified samples. Sampling may be stratified in various ways such as monitoring all culverts over 48", 60" streams or above, all Class I streams. Or, consider monitoring all culverts over 48" in diameter and bridge installations.

2. Adhere rigorously to the 48-hour, post-construction sampling protocols.

3. In general, paired data collection is a necessity to monitor potential changes in time. Some turbidity sampling instances in FY 2002 were not paired and it is difficult to determine if the turbidity readings reflected changes due to construction impacts. Timing of sample collection is critical for accurate monitoring and data analysis.

4. Modify the turbidity protocol, which was initiated in late FY 2002, and emphasize definition of the monitoring period relative to construction starts and stops and the temporal 48-hour period.

5. Continue to emphasize pre-season (early spring) contact with each district and the Supervisor's Office structures group to identify the pool of projects requiring turbidity monitoring. This could facilitate random selection of sample sites. Ensure that personnel are available on-site for each project to collect samples according to the protocol.

6. Work with State of Alaska, ADEC, on sampling sites were water quality criteria may be temporarily exceeded.

The following are considerations for changes to the Forest Plan Standards and Guidelines relative to fish passage (RIP2; FISH112 IV G). 1) The Aquatic Habitat Handbook has been updated (effective date 11/16/2001) and its reference number has changed. The new reference is FSH 2090.21 Chapter 30. 2) Current standards and guidelines distinguish between Class I and Class II although the best management practices under section 404(f) of the Clean Water Act does not. Recommend that standards and guidelines be reformatted to provide universal statements common to both Class I and II streams (e.g., prevention of velocity, height, and debris barriers and constriction of channel; selecting structure design that matches channel conditions; encourage use of stream simulation techniques if conditions allow; stipulation that 404 permit be obtained for any situations where passage will not be provided). 3) The design flow standard currently in practice and endorsed by the State of Alaska for hydraulic design is Q_2 with a 2 day delay not Q_2 with a 4 day delay. Recommend that this inconsistency be corrected. To account for expected changes in design flow criteria by the State of Alaska in the near future (from Q_2 with a 2 day delay to one based on percent exceedence flows), it is recommended that standards state that design flows will meet or exceed current State of Alaska criteria. 4) Specify that the design species for Class I streams is 55 millimeter (mm) juvenile salmon. 5) Current Forest Plan standards specify a different design fish in Class II streams dependent on process group. Recommend that 55 mm fish be used in all process

groups until a better understanding of the movement patterns of these populations is available (specie(s) of use would be dependent on which is (are) present).

Stream Temperature/ Buffer Effectiveness/ Buffer Stability

Recommendations include no corrective action with respect to maintaining stream temperatures necessary for protecting beneficial uses in the Tongass National Forest at this time. It is reasonable to assume that the current riparian standards and guidelines maintain the riparian processes associated with moderating stream temperatures beneficial to aquatic life.

Recommendations include continued focus on the implementation of riparian buffers and their stability or windfirmness over time as a higher priority for Forest Plan monitoring. In addition, we recommend that stream temperature alone not be reported as effectiveness monitoring results pending further evaluation. Since we may be unable to explicitly link stream temperature data to current BMPs, this approach is more defensible and more consistent with the monitoring and feedback strategy approved by the regulatory agencies. There is strong evidence that the maintenance of intact riparian forest is a primary mechanism for moderating stream temperatures. There is also strong evidence to suggest that rainfall itself has a moderating influence. Forest Plan activities do not alter climate and other important temperature-moderating mechanisms. However, if stream buffers are not implemented as planned, or if they subsequently blow down, stream temperatures may be affected as a result. Therefore, it is a more efficient use of time and funds to monitor the buffers and provide immediate feedback to managers regarding their implementation and effectiveness.

The Forest Plan does not require stream temperature monitoring specifically as a method for evaluating the effectiveness of BMPs. Stream temperature data must be interpreted in concert with climate, stream flow, riparian, and watershed data over the long-term. Understanding stream temperature regimes is essential to cumulative effects analysis, continued management, and restoration of previously harvested watersheds. We do recommend that stream temperature data collection continue in a more strategic effort in conjunction with other monitoring efforts in specific watersheds (e.g. case study watersheds and resident fish or coho MIS watersheds, etc).

Recommendations for improving the utility of the stream temperature data collected in the Tongass National Forest were included in the 2000 and 2001 Annual Monitoring and Evaluation Reports. The issues associated with temperature monitoring have not been resolved; action is recommended. The evaluation of the Prince of Wales Island data underway will contribute to the development of a more strategic use of stream temperature in the context of monitoring at the Forest Plan or project scale.

In regard to stream buffer effectiveness, an understanding of the complexities of predicting and abating windthrow in RMAs is required to move closer toward the achievement of Ecosystem Health objectives. A better understanding of windthrow and more effective prescriptions for windthrow abatement will occur through the continued monitoring of the incidence of windthrow and the correlation of associated spatial and structural variables.

Relative to buffer monitoring, action to address the issues and recommendations below is anticipated in FY 2003.

1. A more robust data set should be obtained by re-sampling RMAs and adding new RMAs annually to the sample population.
2. Windthrow should be expressed in terms of change in canopy cover by registering low elevation digital images to orthographic images.
3. Windthrow within control areas should be assessed for comparison to RMAs.
4. A statistical study design is recommended that will describe the sample size required and method for the correlating associated variables.

5. Resource personnel, who are involved in the design and implementation of RMA prescriptions, should be informed of monitoring results so adaptive management can be applied.

6. Consider specifically including and defining this monitoring effort within the Forest Plan.

Other Aquatic, Riparian, Watershed Attributes

No corrective action with respect to the Forest Plan standards and guidelines for protecting fish, riparian, soil and water in the Tongass National Forest are recommended at this time. Very few projects consistent with the 1997 Forest Plan have been implemented to date. Very few monitoring results are available at this time and the opportunities to integrate monitoring results are extremely limited.

As monitoring watersheds are established, they will be considered as locations for pilot effectiveness monitoring protocols for wetlands, aquatic invertebrates, etc. Other protocols will be developed on a priority basis in the context of this integrated watershed-monitoring program. Forest Service Research and other agencies are anticipated to participate in the prioritization and development of future monitoring protocols.

Actions underway in 2003 for the synthesis of aquatic monitoring results include the following.

1. Evaluate ecological subsection representation of the stream monitoring reaches in the synthesis.
2. Incorporate data from newly established coho monitoring reaches in the synthesis.
3. Develop case study watershed proposal.
4. Develop quality assurance plan for habitat monitoring surveys.
5. Complete statistical analysis of habitat data.
6. Develop overall study design for habitat monitoring, including best monitoring indicators, sample sizes, and sample frequency.
7. Provide logistical support for aquatic invertebrate sampling.
8. Complete analysis of period-of record Prince of Wales stream temperature data in context of Forest Plan monitoring.
9. Coordinate aquatic monitoring activities upstream of stream monitoring reaches to ensure monitoring is conducted as necessary, especially for pre- and post monitoring sites.

Wetlands Effectiveness Monitoring

Work will continue on development of the monitoring protocols for wetland effectiveness. Additional plot sampling will be completed in FY 2003 associated with the wetland classification. Efforts will be focused on upper elevations and other wetland communities to fill data gaps. The literature review will be completed for the purpose of identifying our current state of knowledge regarding wetland functions and values and to evaluate the data gaps in our knowledge so we can further plan supplementary monitoring efforts if needed.

Air Quality, Karst and Caves, Minerals and Geology

Air Quality

No corrective action is recommended with respect to maintaining current air resource conditions on the Tongass National Forest. We do recommend specific actions with respect to this monitoring.

Recommendations to modify the context and methods of the air quality include suggestion to eliminate this monitoring question as a "stand-alone" resource area in the Forest monitoring program. Incorporate air quality monitoring activities into Wilderness monitoring at the Forest Plan scale, and/or project or program monitoring below or above the Forest Plan scale as appropriate.

Direct effects of Forest Plan implementation activities on air quality are likely to be temporary, limited, and highly localized. Very localized, low levels of air pollutants are unlikely to be detected by the current air quality-monitoring network maintained by ADEC. Given the closure of pulp mills in Ketchikan (1997) and Sitka (1994) it is less likely in 2002 or in the foreseeable future that Forest Plan implementation will have indirect effects on air quality in the Forest. There are no Class I areas within or near the Tongass National Forest. The National Forest is held to the same ambient air quality standards as the rest of Southeast Alaska. ADEC, in consultation with EPA, has a long-term strategy for air quality monitoring that is responsive to emissions and community concerns. Their network analysis does not identify any concerns related to the Tongass National Forest (ADEC, 2001).

Recommendations follow to review the management of the Tongass National Forest and direction for air quality monitoring as a Forest Plan monitoring activity. Air quality in the Tongass National Forest and Southeast Alaska in general is more likely to be affected by long-range transport and global processes that are much broader in scale than the Forest Plan. Effects on air quality may be more appropriately addressed through programmatic baseline monitoring in Wilderness and/or by participating in broader regional or national air quality monitoring efforts. The Tongass National Forest Ecology Program has responsibility for air resources and is developing protocols for re-measurement of the permanent lichen plots established in Wilderness Areas across the Forest (Geiser, Derr, & Dillman, 1994). Reconsider the use of the ADEC air quality-monitoring network as an annual, sole source of evaluation criteria for achieving state and federal ambient air quality standards across the Tongass National Forest. Consider resuming use of lichen biomonitors or other monitoring techniques more appropriate to the desired scale and objectives of monitoring air quality.

ADEC's network analysis indicates that the Juneau station is "neighborhood" scale, with dubious applicability beyond the Mendenhall Valley (ADEC, 2002). For over five years now, the Juneau data reflect very low levels of particulate matter in a residential/urban setting. It is very unlikely that this station could detect even lower levels of particulate matter originating from or affecting the Tongass National Forest at the Forest scale.

Recommendations include changing the sampling methods for Air Quality from an annual to an activity completed every five years. This five-year summary would still involve evaluation of information from the State Department of Environmental Conservation and the U.S. Environmental Protection Agency.

Karst and Caves

Preliminary indications show karst and cave management standards and guidelines, where fully applied and focused on system protection, are effective in protecting the integrity of significant caves and karst resources. Recommendations for revising current Standards and Guidelines to accomplish this have been developed. Recent project planning efforts associated with development of environmental documents have incorporated implementation of the revised standards and guidelines for karst and caves. These revised standards and guidelines protect the function and integrity of the karst systems, rather than individual features.

In FY 2003, the Tuxecan and Kosciusko projects will move further towards incorporating these Standards and Guidelines in conjunction with the midterm review of the Forest Plan. Continued monitoring efforts will focus on the success of the prescriptions in those units and the wind tolerance of the remaining forest and associated buffers. Pre-harvest monitoring of caves is significant to determine baseline data on sediment, flow, and windthrow.

Monitoring of karst and cave systems adjacent to timber harvest units and roads indicate that past harvest activities and road construction implemented prior to the new standards and guidelines, may have contributed to changes in the karst hydrology of the systems, and introduced sediment and debris into some cave systems.

Continued emphasis of implementation of prescribed timber harvest suspension as well as prudent road location design and construction is essential. Continued monitoring of the implementation of Karst and Cave standards and guidelines is planned.

Future project planning includes utilizing Light Distancing And Ranging (LIDAR.) This technology generates 10-foot contour digital elevation model (DEM) maps that can be manipulated by software (e.g. Terra Model) to generate and highlight depression contours. This process can be utilized to indicate the position of sinkholes, closed basins, insurgences, and resurgences (springs) both through the forest canopy and in the second growth areas. The presence of these features can be verified by aerial photograph interpretation and field reconnaissance. Significant schedule delays are typical in completing LIDAR work.

Continued training and utilization of karst specialists, hydrologists, and soil scientists is essential in implementation of the karst and cave standards and guidelines. The most sensitive areas or those of high vulnerability should be identified and removed from the suitable lands base before harvest units are proposed. Tongass National Forest Land and Resource Plan Implementation policy clarification for karst management standards and guidelines is currently in the review process.

Karst and Caves Effectiveness Monitoring

Monitoring of the effectiveness of the implementation of the standards and guidelines over the past few years has shown the need for clarification of the implementation procedures and identified changes to the standards needed. These changes were implemented in the Licking Creek, Kosciusko and Tuxecan Island Projects but the clarification statement has yet to be completed. This will be a priority for 2003, incorporating the recommendation of the Karst Review Panel convened in 2002.

Preliminary indications show karst and cave management standards and guidelines, where fully applied and focused on system protection, are effective in protecting the integrity of significant caves and karst resources. For example, minimum standards for karst and cave protection associated with feature protection were implemented in the Heceta Sawfly Project area in 2001, and the effectiveness of the prescriptions and mitigation was demonstrated.

The Interagency Monitoring and Evaluation group concurred on a recommendation to set up permanent transects in the Heceta Sawfly units to monitor the effectiveness of the timber harvest prescriptions and karst mitigation. Pre-harvest monitoring of caves is significant to determine baseline data on sediment, flow, and windthrow. Inventory and monitoring of the backlog of caves discovered during the past two field seasons is planned.

Minerals and Geology

Monitoring of the minerals operations showed that this monitoring contributes to ensuring protection of the soil and water resources and reducing the potential for significant environmental consequences. The minerals specialists effectively worked with the operators to resolve problems associated with monitoring plans, erosion, site safety/security and developing associated mitigation plans.

Required approval of site operation plans provides the Forest Service the opportunity and authority to control the effects of the development of forest surface resources. Recommendations follow to continue the minerals monitoring program.

Recreation and Transportation

ATV Management and Effectiveness

Evaluation of the Off Road Vehicle (ORV) monitoring shows that some impacts to the soil and water resources were reported. Increased use of four-wheelers and snowmobiles could significantly increase the effect on the soil and water resources and therefore continued monitoring of the impacts is recommended, with emphasis on high use areas, wetlands and other sensitive areas.

Soil scientists, ecologists, and botany specialists should be involved in these site evaluations. Continued emphasis on education of the public on potential impacts associated with ORV use is essential. Recommendations include:

Provide support for districts wanting to implement meaningful inventory and monitoring efforts focusing on rutting and vegetation loss in muskeg areas. The wet, organic soils of these areas are heavily impacted by repeated ATV use.

Prevent degradation of fish habitat by posting signs at trail and stream intersections where spawning streams were used as travel routes, as completed on Sitka Ranger District.

Provide peer group education through partnerships with local ATV clubs and develop education plans to do outreach with the schools on this topic, such as is occurring in Yakutat Ranger District.

Initiate a management plan addressing Kruzof Island ATV use in 2003.

Transportation

Bark accumulation and oil sheen monitoring provide information to determine compliance with Alaska Water Quality standards for settable residues in marine waters as well as to satisfy requirements for the EPA NPDES permits. This monitoring provides information to evaluate potential impacts to water and soil resources. More extensive monitoring will be conducted at the sites, which show accumulations requiring annual monitoring per regulation.

The monitoring of oil sheen is also required by regulation and will continue at all sites during times of operation. The monitoring of bark accumulations and oil sheens will continue in the next fiscal year.

During periods of log transfer operation, receiving waters at the LTF will be visually monitored daily for the presence of an oil sheen. Daily Oil Sheen Logs will be maintained at the Districts. The presence of any oil sheen shall be recorded, with the date, name of observer, cause of or source of oil sheen, and corrective measures taken; this information will be reported to the Supervisory Tongass Environmental Engineer. This information will be included in the annual report that is due by January 31 of the year following each calendar year of operation and discharge under the General NPDES Permit.

Goal 1: Ecosystem Health (Objective 1.b)

Promote ecosystem health and conservation using a collaborative approach to sustain the Nation's Forests, grasslands and watersheds.

- Objective 1.a—Improve and protect watershed conditions to provide the water quality and quantity and the soil productivity necessary to support ecological functions and intended beneficial water uses.
- **Objective 1.b—Provide ecological conditions to sustain viable populations of native and desired nonnative species and to achieve objectives for Management Indicator Species (MIS)/focal species.**
- Objective 1.c—Increase the amount of forests and grasslands restored to or maintained in a healthy condition with reduced risk and damage from fires, insects and diseases, and invasive species.

In reference to **Objective 1.b,** the monitoring completed on biodiversity, fish management indicator species (MIS), endemic wildlife species, and wildlife MIS describe the status of the Forest relative to ecosystem health. Significant issues addressed in the monitoring this year included:

Maintenance of contiguous blocks of old growth to support viable and well distributed populations of old growth related species

Effects on biodiversity

Consistency of management practices on sensitive species conservation

Population trends for fish MIS related to habitat changes

Population trends for wildlife MIS related to habitat changes

Population levels and associated distribution of mammalian endemic species

Biodiversity, Fish Management Indicator Species, Wildlife Management Indicator Species

Biodiversity

Continue detailed descriptions of changes in OGRs and associated rationale in project-level NEPA documents. Develop procedures within the GIS to make it easier to track changes in OGRs, including the following:

1. Track all non-development LUDs within the boundary of the OGR,
2. Code OGR by size (large, medium, and small),
3. Include the size and composition of the OGRs before and after the changes in the NEPA documents, and
4. In the FY2003 Annual Monitoring Report, provide a summary of the rationale used to modify small OGRs over the past 5 years.

Monitoring the contiguous blocks of old growth has shown that they have been maintained in a system of old growth reserves (OGRs) to support viable and well distributed populations of old growth related species. The 1997 evaluation of the OGR system is still functional, however given the fluctuation in the land base and harvest levels since the completion of the 1997 plan the need for additional analysis is being looked at as part of the Forest Plan midterm review. Recommendations include continuing to review and modify small OGRs during project level planning. Emphasis is placed on tracking changes in OGRs through the environmental document process utilizing GIS. Recommendations follow to maintain GIS LUD coverage for each year.

The potential effects on biodiversity were inferred from the amount of timber harvest proposed in the Forest Plan. The acres of productive old growth (POG), treated by some type of timber harvest method, were tracked and summarized by ecological province. Recommendations for future analysis of the effects on biodiversity include continuing to apply the assumption from the Forest Plan analysis that the amount of timber harvest is an index of potential effects on biodiversity. Emphasis for work next fiscal year is focused to continue progress on constructing existing vegetation maps for forest structure. Recommendations also include finishing the attributing of the existing vegetation and managed stand layers in GIS, which have been re-designed to track partial cutting separate from even-aged treatments. Additional recommendations include:

Continue work on vegetation classification and mapping. Continue to evaluate the fieldwork completed in the accuracy assessment project and refine classification schemes accordingly. Provide information on volume class 6 and 7 stands until coarse canopy analysis is complete (Correspondence, USDA Forest Service 2002).

Emphasize tracking in GIS and evaluate attributes for OGRs to consider delineation of size, composition, and disturbance regimes.

The evaluation of management practices suggests that there is no need to revise the Regional Forester's sensitive species list at this time. Although there is no need to revise the list, it may be time to reconsider the Regional Forester's sensitive species list based on the amount of land protected and information gathered since the list was last revised.

The Forest Plan standards and guidelines for sensitive species generally appear adequate. However, a mechanism needs to be found to apply the marine mammal disturbance standards and guidelines to non-Forest Service personnel and vehicles not under the direct supervision of Forest Service personnel (e.g., log rafts under tow).

The design of the partial harvest standards and guidelines for goshawks and marten should perhaps be reconsidered. Completed analyses should fully examine the desired stand structure, which, potentially might be the best system for the majority of rainforest forest biota as well as best for the long-term ecological function of the stand many decades into the future.

Tongass biologists and botanists need to assure that the wording of each Biological Evaluation (BE) and Biological Assessment (BA) determination is consistent with Forest Service Manual direction. Their work must consider the most recent list of threatened and endangered species as provided by the NMFS and the USFWS. Forest biologists and botanists need to assure consistency. Continued emphasis needs to be placed on description of logic and survey results for the determinations. BE/BA determinations need to be based on the type and magnitude of the proposed project, on site-specific species surveys or local information such as existing databases, on scientific literature and/or previous analyses. Given such information, logical deductions may then be made in such a manner that they can be replicated and verified, if necessary, in a peer-reviewed manner.

Fish Management Indicator Species (MIS)

Year 2002 was the fourth year for a resident fish MIS monitoring program. A major goal for the year was to monitor all identified treatment and control streams, and this goal was nearly achieved. Control streams were added to the design in 2000 following a recommendation from the IMEG. Control streams are not required for the pared-t test, but will help to explain changes in the fish populations that might not be related to timber harvest

An employee was hired in 2002 to lead the population estimates and the habitat surveys. This person traveled to the ranger districts and linked up with district employees to complete the habitat surveys. The Ketchikan district completed their monitoring with an experienced crew. Both approaches achieved consistent results and we plan to repeat that this next year.

The Forest Plan states we will monitor Dolly Varden char and cutthroat by annually evaluating the ADF&G's harvest statistics and completing population surveys on a sample basis, if necessary. We have found the harvest statistics to be only available for the larger and more popular sport fishing streams. Many of these streams are anadromous and do not have planned future logging. Therefore, we recommend continuing our population surveys of resident Dolly Varden and cutthroat in the twenty streams that have been identified with planned future logging.

The Forest Plan could be amended to de-emphasize reliance on ADF&G's harvest statistics and emphasize monitoring the abundance and habitat of resident Dolly Varden and cutthroat that spend their entire lives in the freshwater, have relatively simple life history patterns, and are not subject to potentially variable competition with salmon.

It is recommended that monitoring of resident Dolly Varden and cutthroat continue in FY03 and beyond. The planned monitoring program will be completed when at least 16 of the treatment streams have been logged and the amount of post-logging data is approximately equal to the amount of pre-logging data. This will mean an overall monitoring program of at least 10 years.

Progress was made in developing monitoring protocols for coho and pink salmon MIS and this work is planned to continue in the next fiscal year. It is recommended that the Forestry Sciences Laboratory continue to develop the monitoring protocol for juvenile coho in tributary streams. If an effective and affordable monitoring protocol can be developed, the Forest Service should request funding for implementation. If a protocol cannot be developed, the FS may drop coho as an indicator species or continue to monitor the relatively insensitive adult harvest and escapement data.

For coho salmon monitoring, no changes in the Forest Plan are recommended at this time. Future recommendations may develop following completion and testing of the juvenile coho-monitoring plan by the Forestry Sciences Laboratory. The Forest Plan states we will annually evaluate the ADF&G's commercial harvest and escapement statistics for coho salmon. We will continue evaluating those comprehensive databases. There is a concern that the region-wide coho databases are insensitive to National Forest management.

For pink salmon, we initiated review of spawning escapement data that has been collected in over 700 watersheds over the last 30 years and timber harvest history for the same watersheds.

If trends are detectable in the existing data, we plan future monitoring to see if trends in pink salmon abundance are also evident with logging conducted under the current standards and guidelines. For pink salmon, the Forest Plan states we will annually evaluate the ADF&G's commercial harvest and spawning-survey (escapement) statistics. We plan to continue evaluating those data sets as they are comprehensive and are good indicators of the health of the pink salmon populations. There is some concern that the data sets are not sensitive to potential effects of timber harvest as they are region-wide and timber harvest on the National Forest potentially affects a relatively small number of watersheds.

It is recommended that we continue looking for trends in historic pink salmon escapement and timber harvest data. If trends are detectable, we will monitor looking forward to see if trends continue following logging conducted under the current standards and guidelines. It is assumed that older logging was less fish friendly than logging planned under the current standards and guidelines. Substantial progress in review of the historic data may be possible in 2004.

If trends between logging and pink salmon escapement are not evident in the historic data, we will not devote the resources necessary to monitor for potential effects of future logging and will continue to simply review the annual harvest and escapement data.

Kuiu Island has been selected as a pilot for review of the existing pink salmon escapement and logging history data. Eighty-one streams have been identified for Kuiu that have long-term escapement records and logging histories including the amount and location of the logging and the roads stored in the Forest Service GIS database. We have linked the watersheds with escapement data to the Forest Service GIS covers and have summarized some of the initial data. We now need the pink salmon data to be updated to a form suitable for this project and to identify statisticians to complete the trend analysis. We must also decide if we should expand the monitoring beyond the Kuiu Island pilot project.

Wildlife Management Indicator Species

The Forest Service is supporting several monitoring activities and administrative studies useful for addressing indicator species issues. Work is anticipated to continue toward updating the Wildlife MIS list to determine the need to adjust the number of recommended species for monitoring. The adjusted list of species being considered include: goshawk, Alexander Archipelago wolf, Sitka black-tailed deer, American marten, brown bear, northern flying squirrel, and a primary excavator bird. Completion of the task group reports is anticipated in FY 2003.

The first summary of trends in habitats and populations for MIS and proposed MIS will be initiated. Planning Regulations (36 CFR 219.19 (a)(6)) direct that "Population trends of MIS will be monitored and relationships to habitat changes determined." Population trends may be inferred using species-habitat relationships information. This approach involves inferring population trends from trends in amount and condition of habitat over time, based on known relationships between species and habitat.

The midterm Forest Plan Review, as agreed upon in the 1997 ROD, will address economic, social, wildlife, fisheries, and other resource issues and identify potential mid-course corrections in management direction within Forest Plan. The US Forest Service will lead these analyses. The Lab will ask the following questions: "Are the management strategies meeting plan objectives; are the assumptions under which the plan was developed still valid; is there new information that would question the ability of the plan to achieve objectives?"

This section defines the role and scope of MIS monitoring as it pertains to the midterm Forest Plan Review. MIS monitoring is designed to provide information in support of the evaluation of the conservation strategies, but a larger, "bigger picture" approach is needed to actually evaluate the conservation strategies. Evaluating effectiveness of the conservation strategy is a task that would likely never be assigned to any one research or monitoring project. It is an undertaking that would cross disciplinary boundaries. Such an undertaking clearly falls into the domain of synthesis and is larger in scope than MIS monitoring. For example, the evaluation of the efficacy of 1000-foot beach buffers may require information on flying squirrel dispersal patterns, goshawk habitat selection, and efficacy of management practices in the adjacent matrix lands.

Collectively, findings from MIS monitoring, other monitoring analyses, new scientific literature, and administrative studies will feed into workshops and other synthesis efforts to evaluate management strategies within Forest Plan.

Small Endemic Mammals

The Forest Plan classifies all islands smaller than 1,000 acres as unsuitable for timber harvest. Survey and management standards and guidelines were added to further reduce the risk to endemic mammals. Where distinct taxa are located proposed project such as the research described below were designed to ensure their long-term persistence on the island.

The Pacific Northwest Research Station is conducting a long-term study to identify the existence of endemic mammal taxa throughout the island archipelago of SE Alaska. These studies will continue and will be accelerated to examine islands less than 163,000 acres for the potential presence of locally endemic taxa that may be at risk as a result of additional vegetation management activities. If initial results of these studies document the existence of endemic mammals on islands less than 163,000 acres, then survey and management direction included under the Terrestrial Endemic Mammals in the revised Forest Plan will be applied to those islands.

Dr. Winston Smith produced an additional report on small endemic mammals during FY2002: (1) "Evolutionary Diversity and ecology of endemic small mammals of southeastern Alaska with implications for land management planning" (Winston 2002 Draft); and, he was a contributing author with Thomas Hanley and Scott Gende in (2) "Maintaining wildlife habitat in southeastern Alaska: implications of new knowledge for forest management and research". In the latter document the authors conclude that:

> "We suggest that future research, development and application focus on plant and animal communities and management of vegetation to achieve specific objectives for wildlife habitat. We suggest that such efforts emphasize silviculture of second-growth forests, increasing understanding of old growth reserves, greater knowledge of distribution of endemic small mammals, and alternatives to clear cutting. Models of evaluating black tailed deer habitat and populations are needed for subsistence-hunting management, and some work needs to be directed at interactions between tourism and selected wildlife species."

Recent ecological studies of endemic populations of northern flying squirrel and southern red-backed voles provide the first quantitative estimates of habitat distribution, demography, and ecological correlates of abundance in southeastern Alaska.

The conservation strategy as defined in 1997 (Forest Plan) has not yet proven to be effective for the northern flying squirrel. The conservation strategy is based on the hypothesis that squirrel populations occupying old-growth reserves (OGR) interact freely in a "metapopulation", using corridors, beach and riparian buffers for movement. Initial field research indicates that one old growth reserve on Kosciusko Island and others in north central or northwestern Prince of Wales Island contain northern flying squirrels. It is not known as yet how representative the Prince of Wales Island OGRs are in relation to flying squirrel populations in other areas. Finally, there appears to be some indication of differences in the population density of flying squirrels on Mitkof Island, where red squirrels are present.

The risk of extirpation in managed landscapes is likely less for both old-growth associates than was assumed during the revision of the Tongass Land Management Plan because abundant noncommercial forests apparently contribute to breeding populations of flying squirrels, and red-backed vole populations may be able to persist in managed second growth stands.

Still, there are important questions for both species regarding the influence of annual population fluctuations on habitat distribution, stand and landscape features that restrict dispersal, and vegetative and structural characteristics of second-growth stands that will sustain breeding populations of these species.

Goal 1: Ecosystem Health (Objective 1.c)

Promote ecosystem health and conservation using a collaborative approach to sustain the Nation's Forests, grasslands and watersheds.

- Objective 1.a—Improve and protect watershed conditions to provide the water quality and quantity and the soil productivity necessary to support ecological functions and intended beneficial water uses.
- Objective 1.b—Provide ecological conditions to sustain viable populations of native and desired nonnative species and to achieve objectives for Management Indicator Species (MIS)/focal species.
- **Objective 1.c—Increase the amount of forests and grasslands restored to or maintained in a healthy condition with reduced risk and damage from fires, insects and diseases, and invasive species.**

In reference to Objective 1.c, the monitoring completed on biodiversity describes the status of the Forest relative to ecosystem health. Significant issues addressed in the monitoring this year included:

Destructive insect and disease organism status relative to increases to potentially damaging levels following management activities.

Inventory, assessment and management strategies related to invasive plants on the Tongass National Forest and the need to prioritize LUDs with action plans outlining opportunities for assessment and control of specific species.

Biodiversity

The most important diseases and natural declines on the Tongass National Forest in 2002 were wood decay of live trees, hemlock dwarf mistletoe, and yellow-cedar decline. Heart and butt rot fungi cause substantial decay in late seral spruce-hemlock forests. No serious insect or disease in young-growth stands was detected through monitoring efforts. The monitoring work conducted annually by the State and Private Forestry branch of the U.S. Forest Service, Forest Health Group and the Forest Silvicultural staff is adequate.

Monitoring and inventorying insect and disease organisms takes place through efforts of the Forest Service State and Private Forestry, Research, and the National Forest System. Before a harvest prescription is developed, Forest silvicultural staff survey insect and disease conditions. Following harvest, on-the-ground inspections are conducted to monitor stand development. At a minimum, inspections occur 3 to 5 years after harvest and again 12 to 20 years after harvest. These inspections include identifying insect and disease conditions and treatment needs to improve forest health.

Currently the Forest Service is exploring alternatives to clearcutting where portions of the stand, either as single trees or groups of trees, are left as legacy (residual) trees. Questions have been raised as to whether increased blowdown and increased insect and disease damage will occur due to bole wounding of residual trees and/or retention of mistletoe and other infestations within the stand. These questions are being studied in a series of three research installations across the Tongass National Forest. Results of these studies are being analyzed.

The arthropod diversity (mostly insects and arachnids) in old-growth stands (Polk Inlet, POW) compared to second growth stands (Maybeso Experimental Forest, POW) is now being determined, and the results will be available in about a year.

The State and Private Forestry, Forest Health Group, branch of the Forest Service flies annual aerial detection surveys over Southeast Alaska. The location of insect and disease activity is mapped and entered in a geographic information system (GIS) database. In addition to the aerial survey work, on-the-ground site visits are also conducted. In general, current management reduces the incidence and severity of insect and disease occurrence by removing infected trees through timber harvest. Even-aged vegetation management (clear cutting, seed tree or shelter wood regeneration methods) removes defective trees with fungal infections or those with mistletoe. The Forest Plan estimated that approximately 80 percent of future harvests would use the even-aged system. Past management has been above this level. The young growth that results after an even-aged harvest is vigorous and usually decay-free.

Goal 2: Multiple Benefits to People (Objective 2.a)

Provide a variety of uses, values, products and services for present and future generations by managing within the capability of sustainable ecosystems.

- **Objective 2.a—Improve the capability of the Nation's forests and grasslands to provide diverse, high-quality outdoor recreation opportunities.**
- Objective 2.b—Improve the capability of wilderness and protected areas to sustain a desired range of benefits and values.
- Objective 2.c—Improve the capability of the Nation's forests and grasslands to provide desired sustainable levels of uses, values, products, and services.
- Objective 2.d—Increase accessibility to a diversity of people and members of underserved and low-income populations to the full range of uses, values, products, and services.
- Objective 2.e—Improve delivery of services to urban communities.
- The Tongass achieved these objectives through monitoring several issues that overlap some of the various objectives. The monitoring completed to accomplish the objective is listed respectively. Detailed summary evaluation and action plan associated with the monitoring issues will be summarized under only one objective.

In reference to **Objective 2.a,** the monitoring completed on recreation and tourism, and wild and scenic rivers describe the status of the Forest relative to multiple benefits to people. Significant issues addressed in the monitoring this year included:

Management of Forest relative to the prescribed Recreation Opportunity Spectrum (ROS) classes

Implementation of Wild, Scenic, and Recreational River standards and guidelines

Recreation, Wild and Scenic Rivers

Recreation

The recreation monitoring and refinement of the Recreation Opportunity Spectrum (ROS) classes will continue. Sites with existing recreation facilities and areas of traditional high-use are the focus of the monitoring. Emphasis will be placed on monitoring sites where potential conflicts with users or ROS were reported and monitoring needs were identified. The outfitter/guide special use permit records along with records of guiding activity will continue to be used to define the high commercial use areas.

Districts plan to accommodate monitoring work as a normal course of business. Information related to the ROS and the Forest-wide Standards and Guidelines will be incorporated into special use decisions that will be forthcoming in 2003. The completion of the Shoreline Outfitter/Guide Environmental Impact Statement that will refine management directions for almost 5,000 miles of shoreline along the coast of islands for four ranger districts. Petersburg and Wrangell Ranger Districts will review the allocations provided to outfitters and guides in a late 90's environmental assessment (EA) in 2002. Some monitoring of remote sites is also planned.

Monitoring will also be completed during the coarse of completing condition surveys for trails and developed recreation facilities, and completion of assessments for environmental documents. Changes in ROS will be evaluated relative to land use designations (LUDs) and the National Environmental Policy Act (NEPA).

Wild and Scenic Rivers

It is important to continue analyzing proposed timber sales for their impacts on the eligibility of recommended rivers. Standards and guidelines are being implemented, and used to direct management decisions. Eligibility of specific classifications levels recommended in the Forest Plan is being maintained until Congress makes these designations.

Recommendations include: Assess and evaluate Wild River designations such as the evaluation accomplished on the Blue River in FY2001.Complete the airborne video flight of Blind River to use as a baseline tool for future years management in the river corridor. Due to its connection to the city of Petersburg by road the river receives a high amount of recreation use.

Goal 2: Multiple Benefits to People (Objective 2.b)

- Objective 2.a—Improve the capability of the Nation's forests and grasslands to provide diverse, high-quality outdoor recreation opportunities.
- **Objective 2.b—Improve the capability of wilderness and protected areas to sustain a desired range of benefits and values.**
- Objective 2.c—Improve the capability of the Nation's forests and grasslands to provide desired sustainable levels of uses, values, products, and services.
- Objective 2.d—Increase accessibility to a diversity of people and members of underserved and low-income populations to the full range of uses, values, products, and services.
- Objective 2.e—Improve delivery of services to urban communities.

In reference to **Objective 2.b,** the monitoring completed on wilderness describes the status of the Forest relative to multiple benefits to people. Significant issues addressed in the monitoring this year included:

Effectiveness of Wild, Scenic, and Recreational River standards and guidelines

Implementation of Wilderness standards and guidelines

Effectiveness of Wilderness standards and guidelines

Wild and Scenic Rivers

Monitoring of the standards and guidelines relative to implementation and effectiveness by maintaining the free flowing conditions and outstanding remarkable values for eligible rivers will continue. It is important to note that Appendix E of the FEIS for the Forest Plan determined that 112 rivers with a total length of approximately 1400 miles are eligible for consideration as components of the National Wild and Scenic River System. This is a significant inventory that cannot be effectively monitored with the limited resources available.

Monitoring activities will continue to include monitoring visitor use, outfitter/guide use, compliance of recreation projects within river corridors, and analyzing projected effects from proposed timber harvest.

Detailed information will continue to be collected in monitoring the Anan Creek Bear Observatory specific to public viewing, outfitter/guide use and bear behavior. Monitoring of this site will provide information to evaluate the recreational use consistency with the anticipated use in the Anan management Standards Environmental assessment.

Ongoing NEPA work is anticipated to continue to addresses effects on the recommended wild, scenic and recreational rivers.

Wilderness

Wilderness Implementation and Effectiveness

Monitoring the implementation of standards and guidelines for wilderness will be continued. Monitoring of standards and guidelines is supported through repeated observation and documentation. Monitoring conducted using standard protocols and scientific methods needs to be employed. Application of monitoring protocols and further refinement of the standards will continue.

Emphasis will be placed on collecting baseline inventory data. Focus of this information collection will be to fill data gaps such as the threatened, endangered and sensitive plant inventory, and in some wilderness areas. Additional focus will be placed on monitoring levels of use and quantifying the monitoring data. Specific recommendations include the following:

Conflicts associated with the wilderness objectives of solitude and primitive recreation and aircraft over flights, boat traffic, and dock construction will continue to be addressed through interagency collaborative planning where possible.

An interagency collaborative planning approach is being initiated to deal with future planning efforts in Misty Fiords National Monument.

Validation of the Recreation Boater Simulation (RBSim) 2 model initiated in Misty Fiords National Monument will continue.

The deferred maintenance of recreation cabins and trails in Wilderness will be emphasized and additional funds will be requested to maintain the facilities to an acceptable standard.

Monitoring will continue in areas where illegal or abandoned structures exist or have a history of being rebuilt every year. Efforts will be made to remove these structures and restore the site.

Monitoring will continue for outfitter/guide permit compliance and evidence of trespass uses in all Wilderness units.

The plant monitoring programs, including inventory of invasive species, should continue to further develop the baseline inventory of these remote Wilderness areas. Plant monitoring will ensure that Wilderness standards and guidelines are being met for Threatened, Endangered, and Sensitive Species, as well as establishing a baseline to monitor plant populations in the Wilderness.

The level of use is of concern and monitoring needs to continue to determine if any mitigation is required in Tracy Arm, Rudyerd Bay in Misty Fiords, and White Sulphur springs in West Chicagof-Yakobi.

Campsite inventory and entry into INFRA needs to continue to monitor and track impacts of Wilderness recreation use.

Goal 2: Multiple Benefits to People (Objective 2.c)

- Objective 2.a—Improve the capability of the Nation's forests and grasslands to provide diverse, high-quality outdoor recreation opportunities.
- Objective 2.b—Improve the capability of wilderness and protected areas to sustain a desired range of benefits and values.
- **Objective 2.c—Improve the capability of the Nation's forests and grasslands to provide desired sustainable levels of uses, values, products, and services.**
- Objective 2.d—Increase accessibility to a diversity of people and members of underserved and low-income populations to the full range of uses, values, products, and services.
- Objective 2.e—Improve delivery of services to urban communities.

In reference to **Objective 2.c**, the monitoring completed on heritage resources, land management planning, local and regional economies, recreation and tourism, scenery, subsistence, timber, wild and scenic rivers, wilderness, and cost and outputs describe the status of the Forest relative to multiple benefits to people. Significant issues addressed in the monitoring this year included:

Implementation of heritage resource standards and guidelines

Effectiveness of heritage resource Standards and guidelines in protecting resources

Consistency of land management planning with management objectives of adjacent lands (discussed in Objective 2.d.)

Effects on employment and income (discussed in Objective 2.d.)

Management of Forest relative to the prescribed Recreation Opportunity Spectrum classes (discussed in Objective 2a.)

Effectiveness of attaining the Visual Quality Objectives

Consistency in effects of Forest Management relative to subsistence users with anticipated effects

Implementation of timber harvest standards and guidelines

Restocking of harvested Forest lands five years following harvest

Consistency of Timber Allowable Sale Quantity

Consistency of the non-Interchangeable Components (NIC) of the allowable sale quantity with actual harvest

Proportional mix of timber volume in NIC I and NIC II relative to Forest Plan estimates

Effectiveness of maximum size limits for timber harvest areas

Implementation of Wild, Scenic, and Recreational River standards and guidelines (discussed in Objective 2.a.)

Effectiveness of Wild, Scenic, and Recreational River standards and guidelines (discussed in Objective 2.a.)

Implementation of Wilderness standards and guidelines (discussed in Objective 2.b.)

Effectiveness of Wilderness standards and guidelines (discussed in Objective 2.b.)

Outputs produced by the Forest (discussed in Objective 2.e.)

Heritage Resources

Heritage Implementation and Effectiveness

Heritage resource management procedures mandated by Sections 106 and 110 of the National Historic Preservation Act continue to be implemented. These procedures are outlined in a programmatic agreement that was revised in July 2002. Archaeological inventory is prioritized by the likelihood of locating heritage resource sites, concentrating primarily in the high sensitivity zones. Post-project monitoring on roads and within other activity areas will continue to be accomplished to verify the assumptions of the sensitivity model and to determine whether heritage resources are present but not revealed by standard inventory techniques.

The Forest Plan standards and guidelines are being implemented and are effective in meeting resource objectives, i.e. site protection and preservation. There is a need, however, to continue heritage resource monitoring to ensure that the standards and guidelines are continually met. Significant progress has been made to develop standard monitoring procedures and increase the amount of monitoring inspections. Only a small sample of the Forest's heritage resources

has been monitored. Funding and personnel limit additional stabilization, and/or data recovery efforts. The total number of damaged sites requiring stabilization is few and observed damage continues to be repaired and stabilized.

Heritage site protection is best served through education and public outreach, fostering a fuller appreciation of the values embodied in the archaeological record and thus recruiting the public as active stewards of heritage resources. Delineating this philosophy, the forest's archeologists are increasingly working with public school students, contributing to the development of college curricula (through the University of Alaska Southeast and other institutions), sharing new discoveries at community functions and at public facilities. Through programs such as Alaska Archaeology Month and Passport in Time, archeologists have connected with thousands of Alaskans who now have a better appreciation of the value of heritage resources and our approach to their management.

A closer relationship between Native Americans and archaeologists in the management of heritage resources and the conduct of archaeological research is being developed. New regulations implementing the National Historic Preservation Act require much closer and sustained consultation at all levels of project planning. The ongoing process of repatriation and consultation under the Native American Graves Protection and Repatriation Act bring federal agencies and tribes into close contact. At the same time, in Southeast Alaska, Sealaska Corporation is attempting to begin an active management program for it 85 historic and cemetery sites acquired through the historic and cemetery sites provisions of the Alaska Native Claims Settlement Act (ANCSA 14(h)(1)). Sealaska seeks to work with clans and tribes to develop plans to manage these sites and to influence the management of historic and archaeological sites on other lands (federal, state, private).

A significant step forward in management of heritage resources in Southeast Alaska would be to develop agreements for cooperative management of historic and archaeological site in the region. Working together, clans, tribes, corporations, and federal and state agencies could more effectively learn from and protect these important cultural places.

Scenery Resource

Since the adoption of the Forest Plan in 1997 very little harvest of planned timber sales has occurred which used the Plan's scenery standards and guidelines. Some small timber sales, like the Kuakan Timber Sale, south of Wrangell, and the Todahl Timber Sale, north of Petersburg in Frederick Sound, have been recently implemented which were planned using the current Forest Plan's standards and guidelines. These harvested areas will be the focus of future monitoring activities to determine if the results of this harvest can adequately address the Forest Plan monitoring question.

Monitoring and evaluation reporting is scheduled to occur 3 – 5 years following adoption of the Forest Plan and at approximately 5 year intervals thereafter. In 2002, inclement weather thwarted scheduled monitoring attempts of the Kuakan Timber Sale activities on Deer Island, south of Wrangell. Scenery resource monitoring requires clear weather to allow photographic documentation from established viewing points.

Monitoring of the effectiveness of the Scenery standards and guidelines relative to the harvest unit size, type of silvicultural system used, amount of dispersal between units, and the overall percent of viewshed disturbed are anticipated to continue.

A representative set of viewsheds across the Forest that has been harvested during implementation of Forest Plan standards and guidelines will be selected for evaluation and monitoring. Monitoring is anticipated to assess the effectiveness of alternatives to clear cutting management.

Since the adoption of the Forest Plan in 1997, very little harvest of planned timber sales has occurred which used the Plan's new scenery standards and guidelines. Some small timber sales have been recently implemented which were planned using the current Forest Plan's standards and guidelines. These harvested areas will be the focus of future monitoring

activities to determine if the results of this harvest can adequately address the Forest Plan monitoring question.

Monitoring of the effectiveness of the Scenery standards and guidelines relative to the harvest unit size, type of silvicultural system used, amount of dispersal between units, and the overall percent of viewshed disturbed are anticipated to continue. A representative set of viewsheds across the Forest that has been harvested during implementation of Forest Plan standards and guidelines will be selected for evaluation and monitoring. Monitoring is anticipated to assess the effectiveness of alternatives to clear cutting management.

Subsistence

Recommendations follow to continue to evaluate the effects on subsistence users in rural Southeast Alaska communities and compare those effects with the estimates in the Forest Plan.

Implementation of the subsistence monitoring report template that was developed in FY 1999 will continue every two years. This template organizes and displays monitoring information to facilitate the description of the effects of management activities on subsistence users in different ways. The template will be used in 2002 to provide information for 2001 and 2002.

The Alaska National Interest Lands Conservation Act (ANILCA, 1980) requires a priority for subsistence uses by rural residents on Federal public land in Alaska (Title VIII). Since 1990, the Federal Government has been managing resources for subsistence use on Federal public lands through the Federal Subsistence Board. In 1995, the Ninth Circuit Court of Appeals ruled that the existing scope of the subsistence program should be expanded to include"*...those navigable waters in which the United States has an interest by the virtue of the reserved water rights doctrine*." Subsistence management of these waters became effective in October 1999.

To date, this new responsibility has resulted in the development of investigative projects designed to evaluate the condition of fish stocks important to subsistence fisheries, Traditional Ecological Knowledge (TEK), and consistency of the various existing fish harvest regulations.

A series of projects initiated in FY 2000 on the Tongass were continued in 2001, with additional new projects begun, in cooperation with the Alaska Department of Fish and Game, community governments, and tribal governments. Several other data collection efforts are on going and are in a variety of stages of analysis. Information concerning these data sets can be obtained from the appropriate Forest Service office. These data sets include: Tongass deer jawbone/teeth age data, Tongass leg bone/fat analysis data, Tongass deer pellet count mortality data, Petersburg Ranger District marten study, Petersburg Ranger District deer study, Petersburg Ranger District wolf study, and Thorne Bay Ranger District Heceta Island deer study.

In addition to working through another annual cycle of wildlife regulation proposals, the first cycle of subsistence fishing regulation proposals were evaluated and presented to the Southeast Regional Advisory Council.

Recommendations follow to continue to evaluate the effects on subsistence users in rural Southeast Alaska communities and compare those effects with the estimates in the Forest Plan. Many of the projects are long term in nature and the results will not be available for several years.

Implementation of the subsistence monitoring report template that was developed in FY 1999 will continue every two years. This template organizes and displays monitoring information to facilitate description of the effects of management activities on subsistence users in different ways. The template will be used in 2002 to provide information for 2001 and 2002.

Continuation of the work in support of Federal responsibilities in managing subsistence on public lands and in navigable waters is anticipated. The effects on subsistence resources will continue to be analyzed in NEPA documents and subsistence determinations will be made on these activities.

Consultations with tribes and communications with community leaders took place in many forms. These included informal meetings, informal public open houses, formal 810 hearings, national roadless area meetings, Fish and Game Advisory Board meetings, other organized group board meetings, and teleconferences.

TRUCS updates will be available over the next few years. New TRUCS maps and analysis will be completed when the new data is collected. The annual report from the Subsistence Regional Advisory Council (RAC) and the Federal Subsistence Board response to the RAC report are available from the Office of Subsistence.

Timber

Timber Implementation

The timber harvesting activities were shown to be adhering to the standards and guidelines consistently over the past and in the present. Timber monitoring for timber implementation is recommended to continue focus on the limitation of created openings greater than 100 acres and the 1,000-foot beach and estuary buffer requirement. Continued application of the Forest GIS system to identify and describe the harvest units relative to size, location and beach buffers is recommended.

Timber Restocking

The Silviculture staff on the Tongass monitors the status of all regeneration harvests as required by the 1976 National Forest Management Act (NFMA). NFMA requires lands will be harvested only where they can be adequately restocked within five years. While we do not expect future regeneration problems (southeast Alaska has excellent climatic conditions for re-establishing tree cover after disturbance), it is worthwhile to continue our field surveys and data base tracking. The preparation of this annual monitoring report serves as a good way for the public to be assured we are meeting the NFMA and Forest Wide standard and guideline requirement.

Timber Allowable Sale Quantity

Congress sets the programmed harvest with the development of the budget formulation process each fiscal year. Each District office submits a "bottom up" request for funding to cover the anticipated harvest offer preparation plan that they develop. If the programmed harvest budget is more or less than that developed on the District, the amount of funding can be requested or returned to coincide with the estimated output.

As displayed in the table "Tongass National Forest Timber Sold By Fiscal Year", the amount of timber sold is below the ASQ set in the Forest Plan. This low volume per year sold is probably due to two factors. One is the continuing litigation on planned or existing sales, and the other is the depressed market condition. One or both factors could change in future years. Field inventory resource information is developed as timber sale proposals are developed through the planning process. Therefore, there are adequate accuracy checks to maintain a long-term sustained yield timber program within standards and guidelines to protect resources.

The ASQ is consistent with resources and programmed harvest as long as the suitable timber land base is maintained. Major decreases in the suitable timber land base can create inconsistencies in the balance between the ASQ and programmed timber harvest.

No action is necessary at this time in changing the monitoring process. We plan to continue to monitor the level of programmed harvest.

Timber Non-Interchangeable Components

All timber sale harvest units that were completed during fiscal year 2001 were categorized into non-interchangeable components using the Forest plan operability layer in the geographic information system (GIS). Utilization of this GIS system is recommended to continue, and further revision of the process used to track NIC I and II is ongoing.

As long as the amount of timber offered is below the NIC I amount of the ASQ (219 MMBF/year average) it does not really matter what portion of NIC II is offered, since in theory it would only be offered after the NIC I proportion is satisfied. As depicted in the tables, a substantial amount of NIC II lands are included in timber offerings prior to the NIC I proportion being satisfied. This will help insure that the more economic land base is not over harvested. Conversely, the NIC II inclusion with timber offerings prior to the NIC I component being satisfied decreases the economics of the timber offerings as a whole.

As stated above, not enough data has been collected and analyzed to date to determine if the proportional mix of non-interchangeable components is estimated accurately. If the proportional mix in NIC I and NIC II is not accurately estimated in the Forest Plan it will contribute to higher harvest operating costs. Currently, maps generated from GIS show which areas are NIC I or NIC II. Higher harvest operating costs could limit the ability of purchasers to compete for a timber supply from the National Forest. Higher costs could ultimately drive timber purchasers and manufacturing facilities out of business, if the timber commodity prices do not increase proportionately. It may be likely to see higher operating costs generated on National Forest timber sales with the implementation of the 1997 Forest Plan. Forest Service interdisciplinary teams that plan timber sales need to weigh the costs and revenues of adding NIC II lands to increase timber volume prior to the NIC I proportion of the ASQ being satisfied. No action is recommended at this time. Continued monitoring is necessary to evaluate the proportional mix of harvest from NIC I and NIC II category lands.

No action is necessary at this time in the monitoring process or proportional mix of NIC I and II. Recommendations follow to continue to monitor the trend of harvest from NIC II lands.

Timber Maximum Harvest Unit Size

The Forest demonstrated effective management for compliance with criteria for the maximum opening size and criteria for approving openings larger than 100 acres. Continuation of the present implementation and monitoring is recommended. Opening size for a number of years has continued to decline. This is a result of increased consideration for riparian, visual, wild life, fish and other resources. When size limits are occasionally exceeded it is done only after analysis and line officer approval in an EIS or EA and subsequently issued decision document.

Continued application of the USFS GIS and SIS databases for tracking and analysis of openings is recommended. The preparation of this report question serves as a good way for the Public to be assured we are meeting opening size requirement.

Goal 2: Multiple Benefits to People (Objective 2.d)

- Objective 2.a—Improve the capability of the Nation's forests and grasslands to provide diverse, high-quality outdoor recreation opportunities.
- Objective 2.b—Improve the capability of wilderness and protected areas to sustain a desired range of benefits and values.
- Objective 2.c—Improve the capability of the Nation's forests and grasslands to provide desired sustainable levels of uses, values, products, and services.
- **Objective 2.d—Increase accessibility to a diversity of people and members of underserved and low-income populations to the full range of uses, values, products, and services.**
- Objective 2.e—Improve delivery of services to urban communities.

In reference to **Objective 2.d,** the monitoring completed on land management planning, local and regional economies, recreation and tourism, and subsistence describe the status of the Forest relative to multiple benefits to people. Significant issues addressed in the monitoring this year included:

Consistency of land management planning with management objectives of adjacent lands

Effects on employment and income

Management of Forest relative to the prescribed Recreation Opportunity Spectrum classes (discussed in Objective 2.a.)

Consistency in effects of Forest Management relative to subsistence users with anticipated effects (discussed in Objective 2.c.)

Implementation of Wild, Scenic, and Recreational River standards and guidelines (discussed in Objective 2.a.)

Effectiveness of Wild, Scenic, and Recreational River standards and guidelines (discussed in Objective 2.a.)

Implementation of Wilderness standards and guidelines (discussed in Objective 2.b.)

Effectiveness of Wilderness standards and guidelines (discussed in Objective 2.b.)

Land Management Planning

Continuation of the Tongass efforts to improve government-to-government relationships as well as collaborative, community-based resource stewardship is essential to achieve compatibility of Forest Service management activities with the goals and objectives of adjacent lands.

Monitoring of the effects of the Tongass National Forest management on lands, resources, and communities adjacent to or near Tongass projects will continue. Effects upon forest lands from adjacent land activities managed by other government agencies and under the jurisdiction of local governments will be monitored as well.

Local and Regional Economics

Employment and Income

Continued monitoring and evaluation of the effects on employment and income from Forest Management is underway.

Clarification and segregation of the category definitions is necessary to compare the Southeast Alaska Employment and earnings, Annual Equivalent (Non-agriculture Wage and Salary (NAWS) Employment and Earnings reports and the employment and income estimates in the Forest Plan.

Compensation for less than full implementation in the employment categories needs to be made to the Forest Plan estimates. Re-evaluation and updating of the assumptions and criteria for the Forest Plan model utilized to determine projected employment and income levels is recommended.

The Forest Service notifies rural communities in or near the national forests of the program and responds to requests for assistance from communities. The program has grants that are available to (a) organize community action teams, (b) develop community action plans, and (c) implement projects from the community action plan. Grants are competitive and contingent on annual appropriations. Because of the historically high number and size of forest fires occurring in 2002, the Economic Recovery Grant Program was delayed due to reprioritization of funding to support agency forest fire suppression costs.

The Forest Service has entered into a cooperative agreement with the State of Alaska to provide this funding through the State's Community Development Block Grant (CDBG) mini-grant program. The program provides seed money for community projects statewide that will produce long-term jobs.

Monitoring levels of the rural assistance programs should continue. The Forest staff readily works with communities who desire assistance. Some ranger districts have increased collaborative stewardship efforts that often lead to identification and pursuit of RCA opportunities. The Forest has two full-time positions to implement the RCA program.

Goal 2: Multiple Benefits to People (Objective 2.e)

- Objective 2.a—Improve the capability of the Nation's forests and grasslands to provide diverse, high-quality outdoor recreation opportunities.
- Objective 2.b—Improve the capability of wilderness and protected areas to sustain a desired range of benefits and values.
- Objective 2.c—Improve the capability of the Nation's forests and grasslands to provide desired sustainable levels of uses, values, products, and services.
- Objective 2.d—Increase accessibility to a diversity of people and members of underserved and low-income populations to the full range of uses, values, products, and services.
- **Objective 2.e—Improve delivery of services to urban communities.**

In reference to **Objective 2.e**, the monitoring completed on heritage resources, land management planning, local and regional economies, recreation and tourism, scenery, subsistence, timber, wild and scenic rivers, wilderness, and cost and outputs describe the status of the Forest relative to multiple benefits to people. Significant issues addressed in the monitoring this year included:

Consistency of land management planning with management objectives of adjacent lands (discussed in Objective 2.d.),

Effects on employment and income (discussed in Objective 2.d.),

Management of Forest relative to the prescribed Recreation Opportunity Spectrum classes (discussed in Objective 2.a.), and

Outputs produced by the Forest.

Costs and Outputs

Continued monitoring of the costs and outputs is recommended.

Additional data needs to be collected to discern if the costs associated with carrying out the planned management prescriptions are consistent with the Forest Plan estimates. Earlier distribution of allocation information should contribute to help the resource groups plan resource management activities and effectively utilize the allocations to complete work and associated targets.

Goal 3: Scientific and Technical Assistance (Objective 3.a)

Develop and use the best scientific information available to deliver technical and community assistance and to support ecological, economic, and social sustainability.

- **Objective 3.a—Better assist in building the capacity of Tribal governments, rural communities, and private landowners to adapt to economic, environmental, and social change related to natural resources.**
- Objective 3.b—Increase the effectiveness of scientific, developmental, and technical information delivered to domestic and international interests.
- Objective 3.c—Improve the knowledge base provided through research, inventory, and monitoring to enhance scientific understanding of ecosystems, including human uses, and to support decision making and sustainable management of the Nation's forests and grasslands.
- Objective 3.d—Broaden the participation of less traditional research groups in research and technical assistance programs.

In reference to **Objective 3.a**, the monitoring completed on local and regional economies describes the Forest's efforts to using the best scientific information available to deliver technical and community assistance. Significant issues addresses in the monitoring this year included:

> Work completed by the Forest Service with local communities to identify and pursue Rural Community Assistance Opportunities

Local and Regional Economics

Rural Community Assistance Program

Monitoring of the Rural Community Assistance Program is planned to continue in fiscal year 2002. The Forest Service continues to work with the local communities to identify and pursue Rural Community Assistance Opportunities.

The Rural Community Assistance (RCA) Program is continuing to include the Economic Recovery Program (ERP) and the Rural Development (RD) program. The RCA program will continue to indirectly include participation in the Southeast Alaska Community Economic Revitalization Team (SEA-CERT).

The Forest will continue to participate in the ERP program by notifying rural communities of the program and respond to requests for assistance from communities through a competitive grants program. The Forest Service plans to continue to participate in the Rural Development Program to provide this funding through the State's Community Development Block Grant (CDBG) mini-grant program. The Tongass National Forest plans to continue to participate in SEA-CERT in cooperation with the State.

Goal 3: Scientific and Technical Assistance (Objective 3.b, 3.c, and 3.d)

- Objective 3.a—Better assist in building the capacity of Tribal governments, rural communities, and private landowners to adapt to economic, environmental, and social change related to natural resources.
- **Objective 3.b—Increase the effectiveness of scientific, developmental, and technical information delivered to domestic and international interests.**
- **Objective 3.c—Improve the knowledge base provided through research, inventory, and monitoring to enhance scientific understanding of ecosystems, including human uses, and to support decision making and sustainable management of the Nation's forests and grasslands.**

- **Objective 3.d—Broaden the participation of less traditional research groups in research and technical assistance programs.**

In reference to **Objectives 3.b, 3.c, and 3.d**, the monitoring completed on research describes the status of the Forest Relative to using the best scientific information available to deliver scientific and technical assistance.

Research

Monitoring of Research activities is planned to continue. This work is completed in cooperation with the Pacific Northwest (PNW) station to address high priority information needs of the Forest. Priority research is intended for implementation of the Forest Plan as well as intended to contribute information for further amendment and revision of the plan.

1) Geology

Short term:

- Prepare a synthesis of available information on human impacts on Karst soils.

Long term:

- Determine the range of effects of road and timber management on Karst soils.

2) Forestry

Short term:

- **First Priority**: Prepare the Heceta young-growth commercial thinning stewardship pilot study plan, field protocol manual, install monitoring plots and collect baseline data (complete FY 03).
- **Second Priority**: Prepare the Study Plan for the Tongass young-growth adaptive management study and related monitoring plots. The Tongass study tests the efficacy from a timber and wildlife viewpoint of a number of young-growth cultural treatments. These range from planting red alder, to pre-commercial thinning and pruning. This need is the same item as identified under wildlife short-term fourth priority.
- **Third priority**: Evaluate existing predictive models for use in predicting wind-throw in timber stands in Southeast Alaska. If a suitable windthrow model is found, calibrate it for Southeast Alaska conditions.
- **Fourth Priority**: Validate the SEAPROG model for its crown closure prediction sub-routines. This model is currently used for developing marking guides designed to meet the high-risk biogeographic province marten and goshawk requirements for canopy retention.
- **Fifth Priority**: Develop individual tree marking guides that account for relative windthrow risk among leave trees in partial cutting.

Long Term:

- **First Priority**: Understand the effects of partial harvest treatments (especially diameter-limit prescriptions) in old-growth stands on wood production and quality future and present) and wildlife habitat features such as plant species composition, abundance and vertical and horizontal structure.
- **Second Priority**: Identify cultural treatments for young-growth for a wide set of sites and rotation ages to produce trees of differing wood quality. As part of the analysis, identify future niches for Tongass young-growth timber by tree species whether for fiber or high quality saw timber. This item would produce an analysis to identify appropriate species, wood quality, and product mixes.

- **Third priority**: Calibrate the SEAPROG model for partial cutting in late seral forest stands. Understory shrub, herbaceous, and tree response to partial harvesting is a desired aspect of the model.
- **Fourth Priority**: investigate methods for re-introducing structural diversity in landscapes that have been extensively harvested.
- **Fifth Priority**: Add permanent plots to the cooperative stand density study (Farr thinning study) to extend its scope of inference to higher elevation, steeper slopes and poorer sites. An additional objective is to evaluate the need for a 2nd thinning.
- **Sixth priority**: Evaluate disturbance history and dynamics including age and structure of forested ecosystems of SE Alaska. Objective is to gain knowledge into how our forests developed and the disturbance factors, frequency, events that led to their creation as well as those that maintain their rich diversity.

3) Recreation

Short Term:

- **First Priority**: Develop sampling protocols for measuring non-commercial recreational use patterns on the Tongass.
- **Second Priority**: Develop systematic approach to monitoring campsites and related recreation use locations in relation to site impact, and physical or social capacity.
- **Third Priority**: Review the goat/helicopter behavior study plan and data set. Help the region publish findings (see wildlife, below).

Long term:

- **First Priority**: Assess alternate policy options for fostering rural economic health and development.
- **Second Priority**: Understand customer demand and identify best opportunities for expansion of recreation-related infrastructure (cabins, trails, other).
- **Third Priority**: Determine recreation-user demands and level of satisfaction with recreation experiences.

4) Social and Economic

Short term:

- **First Priority**: Develop sampling protocols for understanding the non-commercial recreational use patterns of the Tongass N.F.;

Long term:

- **First Priority**: Test sampling protocols for understanding the recreation non-commercial use patterns of the Tongass.
- **Second priority**: Assess alternate policy options for fostering rural economic health and development;
- **Third Priority**, long term: Determine how satisfied the recreational community is with the quality of experiences in Alaska; and, long term: to better understand the desires, opinions and beliefs of residents in regard to management of the Tongass National Forest.

5) Wildlife

Short term:

- **First Priority:** Assist the Tongass in 5-year Forest Plan science consistency review; long term: The Forest Plan 5-year review will help define the next phase of wildlife viability studies. Major questions include: How do managed landscapes affect community ecology? Are reserve designs adequate? Can species move between HCA's? Is the matrix performing as planned?
- **Second Priority**: Update and revise the deer habitat capability model to better meet management needs (a subsistence issue).
- **Third Priority:** Review the Goat/Helicopter behavior study plan and data set. Help the Region publish findings (see Recreation, above).
- **Fourth Priority:** Prepare an establishment report for the young-growth adaptive management study.
- **Fifth Priority**: Assist the Tongass in developing and reviewing monitoring protocols for MIS species and species of concern for the Tongass National Forest.

Long term:

- **First Priority:** Describe the relationship between forest structure and wildlife communities in SE Alaska. What is the role of un-cut residual trees, once part of the original stand, in providing wildlife habitat in altered forests (e.g. What is the efficacy of the marten and goshawk standard and guidelines?)? As a short-term output, prepare an interim guide for wildlife tree marking based on a literature review of important animal species and their habitat requirements. The interim guide would include a description of beneficial structural features and their number and distribution within stands and across landscapes.
- **Second Priority**: Acquire knowledge about the ecology of a species in relationship to the environment (autecology) of understory plants in response to different overstory treatments and prescriptions that allow varying light levels to penetrate to the forest floor. How do species respond differentially? How would silvicultural prescriptions be designed to benefit wildlife?
- **Third Priority:** Biodiversity assessment/inventory that would develop survey designs and conduct systematic inventories of Tongass mammals, birds, fish, and plants.
- **Fourth Priority:** Prepare a retrospective report on the efficacy of existing young growth management treatments conducted over the last 3 decades on the Tongass. Report would consider at a minimum the timber and wildlife consequences of historical treatments such as gaps, thickets, pruning, thinning in fixed width spacing and variable spacing.
- **Fifth Priority**: Can flying squirrels survive in young growth forests? When does habitat alteration form barrier to their dispersal? (Related to wildlife priority #1).

6) Fisheries

Short term:

- Develop monitoring protocols for salmonids.

Long term:

- Understand the movement patterns of cutthroat trout and Dolly Varden char in high gradient streams. This issue links to best management practices, and riparian standards and guides, and culvert fish passage.

7) Hydrology

Short term:

- **First Priority:** Determine the effectiveness of Forest Plan standards and guidelines in maintaining wetland function.
- **Second Priority**: Advise NFS on appropriate application of effectiveness monitoring protocols, including training, quality assurance plans and study design;
- **Third Priority**: Assistance in cooperatively managing aquatic data sets.
- **Fourth Priority**: Assistance in developing a process for establishing out-year priorities for information needs.

Long term:

- Assist in developing an integrated Forest Plan aquatic monitoring strategy in a watershed context.

The research results will contribute to substantially strengthen the scientific information base needed to support alternative plan development. The research will contribute to the adaptive management feedback loop for the Forest. This feedback will contribute information to evaluate the current plan direction, design monitoring programs, and adjust future management to better address economic, social and environmental concerns.

A significant step forward in management of natural and cultural resources in Southeast Alaska would be to develop agreements for cooperative management of traditional use and gathering areas for special forest products such as basketry and mineral resources. Working together, clans, tribes, corporations, and federal and state agencies could more effectively learn from and protect these important species and the ecosystems in which they occur.

Goal 4: Effective Public Service (Objective 4.a)

Ensure the acquisition and use of an appropriate corporate infrastructure to enable the efficient delivery of a variety of uses.

- **Objective 4.a—Improve financial management to achieve fiscal accountability.**
- Objective 4.b—Improve the safety and economy of USDA Forest Service roads, trails, facilities, and operations and provide greater security for the public and employees.
- Objective 4.c—Improve and integrate informational systems, data structures, and information management processes to support cost-efficient program delivery.
- Objective 4.d—Improve the skills, diversity, and productivity of the workforce.
- Objective 4.e—Ensure equal opportunity in employment practices.
- Objective 4.f—Provide appropriate access to National Forest System lands and ensure nondiscrimination in the delivery of all USDA Forest Service programs.

In reference to Objective 4a, the monitoring completed on costs and outputs describes the status of the Forest relative to ensuring effective public service. Significant issues addresses in the monitoring this year included:

Evaluation of the Costs and Outputs of the Forest (discussed in Objective 2.e.)

Goal 4: Effective Public Service (Objectives 4.b and 4.f)

Ensure the acquisition and use of an appropriate corporate infrastructure to enable the efficient delivery of a variety of uses.

- Objective 4.a—Improve financial management to achieve fiscal accountability.
- **Objective 4.b—Improve the safety and economy of USDA Forest Service roads, trails, facilities, and operations and provide greater security for the public and employees.**
- Objective 4.c—Improve and integrate informational systems, data structures, and information management processes to support cost-efficient program delivery.
- Objective 4.d—Improve the skills, diversity, and productivity of the workforce.
- Objective 4.e—Ensure equal opportunity in employment practices.
- **Objective 4.f—Provide appropriate access to National Forest System lands and ensure nondiscrimination in the delivery of all USDA Forest Service programs.**

In reference to Objectives 4.b and 4.f, the monitoring completed on transportation and recreation describes the status of the Forest relative to ensuring effective public service. Significant issues addresses in the monitoring this year included:

Roads and log transfer facilities (discussed in chapter 3 under Objective 1.a),

Recreation and off road vehicle use (discussed in chapter 3 under Objective 1.a), and

Management of the Forest relative to the prescribed Recreation Opportunity Spectrum (discussed in chapter 3 under Objective 2.a).

Appendix A

Monitoring Questions

MONITORING QUESTIONS

Air Quality

Is air quality meeting State and Federal ambient air quality standards?

Biodiversity

Are contiguous blocks of old growth habitat being maintained in a forest-wide system of old growth reserves to support viable and well distributed populations of old growth associated species and subspecies?

Are the effects on biodiversity consistent with those estimated in the Forest Plan?

Are management practices consistent with current knowledge regarding sensitive species conservation (federally listed threatened or endangered species, Alaska Region sensitive species, and State species of special concern)?

Are destructive insect and disease organisms increasing to potentially damaging levels following management activities?

Fish Habitat

Are population trends for Management Indicator Species (MIS) and their relationship to habitat changes consistent with expectations?

Are fish & riparian Standards and Guidelines being implemented?

Are fish & riparian Standards and Guidelines effective in maintaining or improving fish habitat?

Heritage Resources

Are heritage resources Standards and Guidelines being implemented?

Are heritage resources Standards and Guidelines effective in protecting heritage/cultural resources as expected in the Forest Plan?

Karst and Caves

Are karst and cave Standards and Guidelines being implemented?

Are karst and cave Standards and Guidelines effective in protecting the integrity of significant caves and the karst landscape?

Land Management Planning

Is the management of National Forest System lands consistent with management objectives of adjacent lands and their management plans?

Local and Regional Economies

Are the effects on employment and income similar to those estimated in the Forest Plan?

Has the Forest Service worked with local communities to identify and pursue Rural Community Assistance opportunities?

Minerals and Geology

Are the effects of mining activities on surface Forest Plan expectations, as allowed in approved Plans of Operations?

Recreation and Tourism

Are areas of the Forest being managed in accordance with the prescribed Recreation Opportunity Spectrum (ROS) class in Forest-wide Standards & Guidelines?

Is Off Road Vehicle (ORV) use causing, or will it cause, considerable adverse effects on soil, water, vegetation, fish and wildlife, visitors or cultural and historic resources of the Forest?

Research

Have identified high-priority information needs been fulfilled?

Scenery

Are the Standards and Guidelines effective in attaining the adopted Visual Quality Objectives established in the Plan?

Soil and Water

Are the Standards and Guidelines for soil disturbance being implemented?

Are the Standards and Guidelines effective in meeting Alaska Regional Soil Quality Standards?

Are Best Management Practices being implemented?

Are Best Management Practices effective in meeting water quality standards?

Subsistence

Are the effects of management activities on subsistence users in rural Southeast Alaska communities consistent with those estimated in the Forest Plan?

Timber

Are timber harvest activities adhering to applicable timber management standards and guidelines?

Are harvested Forest lands restocked within five years following harvest?

Is the Allowable Sale Quantity (ASQ) consistent with resource information and programmed harvest

Are the Non-Interchangeable Components (NIC) of the allowable sale quantity consistent with actual harvest?

Is the proportional mix of volume in NIC I and NIC II as estimated in the Forest Plan accurate?

Should maximum size limits for harvested areas be continued?

Transportation

Are the Standards and Guidelines used for forest development roads and Log Transfer Facilities effective in limiting the environmental effects to anticipated levels?

Wetlands

Are wetlands Standards and Guidelines being implemented?

Are wetlands Standards and Guidelines effective in minimizing the impacts to wetlands and their associated functions and values?

Wild and Scenic Rivers

Are Wild, Scenic, and Recreational River Standards and Guidelines being implemented?

Are Wild, Scenic, and Recreational River standards effective in maintaining or enhancing the free flowing conditions and outstandingly remarkable values at the classification level for which the river was found suitable for designation as part of the National Wild and Scenic River System?

Wilderness Areas

Are Standards and Guidelines for the management of wilderness being implemented?

Are Standards and Guidelines for the management of wilderness effective in maintaining the wilderness resource?

Wildlife

Are population trends for Management Indicator Species (MIS) and their relationship to habitat changes consistent with expectations?

Are the population levels and associated distribution of mammalian endemic species on islands and portions of the mainland consistent with the estimates in the Forest Plan?

Costs and Outputs

What outputs were produced in the previous year?

Are the costs associated with carrying out the planned management prescriptions (including those of producing outputs) consistent with those costs estimated in Plan?

Appendix B
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Appendix C

Fish Passage Improvement Structures Planned in FY 2003

Ranger District	Route Number	Milepost	Structure	Fish Passage Required	Project	Contract	Status
Craig	2160000	0.963	2100mm x 15m cmp	N	North Timber Sale	North T.S.**	Unsurveyed
Craig	2160000	1.050	New sills/ backwalls	N/A	Dumpy ATC Timber Sale	Dumpy ATC T.S.*	Designed
Craig	2160000	2.338	2100mm x 13m cmp	N	North Timber Sale	North T.S.*	Unsurveyed
Craig	2160000	3.000	14 m log stringer	Y	North Timber Sale	North T.S.*	Unsurveyed
Craig	2160000	3.550	New sills/ backwalls	N/A	Dumpy ATC Timber Sale	Dumpy ATC T.S.*	Designed
Craig	2160000	4.100	79' bridge	Y	Dumpy ATC Timber Sale	Dumpy ATC T.S.*	Surveyed / designed
Craig	2160795	1.150	70' mod gov furnished	?	Dumpy ATC Timber Sale	Dumpy ATC T.S.*	Unsurveyed
Craig	2160850	2.247	30' log stringer	?	Dumpy ATC Timber Sale	Dumpy ATC T.S.*	Unsurveyed
Craig	2160920	1.247	2100mm x 12 m cmp	N	North Timber Sale	North T.S.*	Unsurveyed
Craig	2160920	1.771	10 m log stringer	Y	North Timber Sale	North T.S.*	Unsurveyed
Craig	2100000	5.190	2840mm x 1910mm x 20m arch	Y	POW Island Fish Passage Improvements II	In final design process	Scheduled 2003
Craig	2100000	0.830	2840mm x 1910mm x 14m arch	Y	POW Island Fish Passage Improvements II	In final design process	Scheduled 2003
Craig	2100000	12.53	18292mm (60') Hamilton bridge	Y	POW Island Fish Passage Improvements II	In final design process	Scheduled 2003
Craig	2100000	12.740	6400mm x 3060mm x 27m arch	Y	POW Island Fish Passage Improvements II	In final design process	Scheduled 2003
Craig	2100000	14.380	18292mm (60') Hamilton bridge	Y	POW Island Fish Passage Improvements II	In final design process	Scheduled 2003
Craig	2100000	18.280	2440mm x 1220mm x 9.71m concrete box culvert	Y	POW Island Fish Passage Improvements II	In final design process	Scheduled 2003

* *Sales are involved with Gateway Forest Products bankruptcy*

Ranger District	Route Number	Milepost	Structure	Fish Passage Required	Project	Contract	Status
Craig	2150000	8.870	2275mm x 15m cmp	Y	POW Island Fish Passage Improvements II	In final design process	Scheduled 2003
Craig	2100000	19.250	2060mm 1500mm x 12m arch	Y	POW Island Fish Passage Improvements II	In final design process	Scheduled 2003
Craig	2150000	8.920	1810mm x 14m cmp	Y	POW Island Fish Passage Improvements II	In final design process	Scheduled 2003
Craig	2100000	18.390	2200mm x 1620mm x 14m arch	Y	POW Island Fish Passage Improvements II	In final design process	Scheduled 2003
Craig	2100000	0.230	1810mm x 19m cmp	Y	POW Island Fish Passage Improvements II	In final design process	Scheduled 2003
Craig	2100000	4.600	9146mm (30') panel bridge	Y	POW Island Fish Passage Improvements II	In final design process	Scheduled 2003
Hoonah	8502	0.797	Ex 48" Hoonah	Y	North Tongass Fish Passage II	Survey/design contract not awarded yet	Scheduled 2004
Hoonah	8502	6.560	Ex 120" Hoonah	Y	Hoonah will have 8 sites	Survey/design contract not awarded yet	Scheduled 2004
Hoonah	8502	7.138	Ex 72" Hoonah	Y		Survey/design contract not awarded yet	Scheduled 2004
Hoonah	8530	3.077	Ex 48" Hoonah	Y		Survey/design contract not awarded yet	Scheduled 2004
Hoonah	8530	3.090	Ex 46" x 72" Hoonah	Y		Survey/design contract not awarded yet	Scheduled 2004
Hoonah	8530	4.130	Ex 24" Hoonah	Y		Survey/design contract not awarded yet	Scheduled 2004
Ketchikan	8400000	28.590	37000mm (121') steel girder bridge		Painted Creek Bridge	50-0116-3-00560	Scheduled 2003
Ketchikan	8000000	22.413	Ex 36" Margaret Bay	Y	South Tongass Survey Design 03	Survey/design contract being prepared	Scheduled 2004
Ketchikan	8000000	22.493	Ex 72" Margaret Bay	Y	South Tongass Survey Design 03	Survey/design contract being prepared	Scheduled 2004

Ranger District	Route Number	Milepost	Structure	Fish Passage Required	Project	Contract	Status
Ketchikan	8000495	0.034	Ex 48" Margaret Bay	Y	South Tongass Survey Design 03	Survey/design contract being prepared	Scheduled 2004
Ketchikan	8040000	1.771	Ex 72" Margaret Bay	Y	South Tongass Survey Design 03	Survey/design contract being prepared	Scheduled 2004
Ketchikan	8040000	4.187	Ex 24" Margaret Bay	Y	South Tongass Survey Design 03	Survey/design contract being prepared	Scheduled 2004
Ketchikan	8040000	5.134	Ex 60" Margaret Bay	Y	South Tongass Survey Design 03	Survey/design contract being prepared	Scheduled 2004
Ketchikan	8040000	5.925	Ex 48" Margaret Bay	Y	South Tongass Survey Design 03	Survey/design contract being prepared	Scheduled 2004
Ketchikan	8040000	0.240	Ex 36" Margaret Bay	Y	South Tongass Survey Design 03	Survey/design contract being prepared	Scheduled 2004
Ketchikan	8050000	1.888	Ex 48" Fire Cove	Y	South Tongass Survey Design 03	Survey/design contract being prepared	Scheduled 2004
Ketchikan	8060000	0.037	Ex 60" Fire Cove	Y	South Tongass Survey Design 03	Survey/design contract being prepared	Scheduled 2004
Ketchikan	8060000	2.305	Ex 24" Fire Cove	Y	South Tongass Survey Design 03	Survey/design contract being prepared	Scheduled 2004
Ketchikan	8060000	2.865	Ex 36" Fire Cove	Y	South Tongass Survey Design 03	Survey/design contract being prepared	Scheduled 2004
Ketchikan	8060200	0.244	Ex 60" Fire Cove	Y	South Tongass Survey Design 03	Survey/design contract being prepared	Scheduled 2004
Petersburg	6031	0.583	1500mm x 12m cmp	Y	Kupreanof Island Fish Passage Improvements	50-0116-2-00516	Scheduled 2003
Petersburg	6031	0.597	1500mm x 18m cmp	Y	Kupreanof Island Fish Passage Improvements	50-0116-2-00516	Scheduled 2003
Petersburg	6031	3.161	2970mm x 2020mm x 17m cmpa	Y	Kupreanof Island Fish Passage Improvements	50-0116-2-00516	Scheduled 2003
Petersburg	6031	3.833	1500mm x 14m cmp	Y	Kupreanof Island Fish Passage Improvements	50-0116-2-00516	Scheduled 2003

Ranger District	Route Number	Milepost	Structure	Fish Passage Required	Project	Contract	Status
Petersburg	6031	4.340	1500mm x 13m cmp	Y	Kupreanof Island Fish Passage Improvements	50-0116-2-00516	Scheduled 2003
Petersburg	6031	5.840	1500mm x 15m cmp	Y	Kupreanof Island Fish Passage Improvements	50-0116-2-00516	Scheduled 2003
Petersburg	6031	6.166	2000mm x 16m cmp	Y	Kupreanof Island Fish Passage Improvements	50-0116-2-00516	Scheduled 2003
Petersburg	6031	6.631	1500mm x 13m cmp	Y	Kupreanof Island Fish Passage Improvements	50-0116-2-00516	Scheduled 2003
Petersburg	6032	0.859	128"x83" steel weir retrofit	Y	Kupreanof Island Fish Passage Improvements	50-0116-2-00516	Scheduled 2003
Petersburg	6032	1.289	108" bottomless arch	Y	Not in contract		
Petersburg	6317	0.043	1500mm x 17m cmp	Y	Kupreanof Island Fish Passage Improvements	50-0116-2-00516	Scheduled 2003
Petersburg	6317	2.112	3600mm x 1800mm x 13m open bottom arch	Y	Kupreanof Island Fish Passage Improvements	50-0116-2-00516	Scheduled 2003
Petersburg	6317	5.699	1800mm x 11m cmp	Y	Kupreanof Island Fish Passage Improvements	50-0116-2-00516	Scheduled 2003
Petersburg	6317	5.880	5000mm (16') panel bridge	Y	Kupreanof Island Fish Passage Improvements	50-0116-2-00516	Scheduled 2003
Petersburg	6319	0.872	3010mm x 813mm x 12m open bottom	Y	Kupreanof Island Fish Passage Improvements	50-0116-2-00516	Scheduled 2003
Petersburg	6319	8.413	1500mm x 11m cmp	Y	Kupreanof Island Fish Passage Improvements	50-0116-2-00516	Scheduled 2003
Petersburg	6319	10.975	1500mm x 13m cmp	Y	Kupreanof Island Fish Passage Improvements	50-0116-2-00516	Scheduled 2003
Petersburg	6323	0.162	1500mm x 14m cmp	Y	Kupreanof Island Fish Passage Improvements	50-0116-2-00516	Scheduled 2003
Petersburg	6204	1.997	3048mm x 17m cmp	Y	Mitkof Island Fish Passage Improvements	50-0116-1-00396	Scheduled 2003

Ranger District	Route Number	Milepost	Structure	Fish Passage Required	Project	Contract	Status
Petersburg	6204	3.579	2845mm x 1905mm x 14m arch	Y	Mitkof Island Fish Passage Improvements	50-0116-1-00396	Scheduled 2003
Petersburg	6204	5.895	1981mm x 15m cmp	Y	Mitkof Island Fish Passage Improvements	50-0116-1-00396	
Petersburg	6204	6.092	1981mm x 15m cmp	Y	Mitkof Island Fish Passage Improvements	50-0116-1-00396	Scheduled 2003
Petersburg	6204	8.002	2438mm x 18m cmp	Y	Mitkof Island Fish Passage Improvements	50-0116-1-00396	Scheduled 2003
Petersburg	6212	0.106	1981mm x 15m cmp	Y	Mitkof Island Fish Passage Improvements	50-0116-1-00396	
Petersburg	6212	0.710	1981mm x 15m cmp	Y	Mitkof Island Fish Passage Improvements	50-0116-1-00396	
Petersburg	6235	0.190	1981mm x 15m cmp	Y	Mitkof Island Fish Passage Improvements	50-0116-1-00396	Scheduled 2003
Petersburg	6235	12.361	1829mm x 18m cmp	Y	Mitkof Island Fish Passage Improvements	50-0116-1-00396	Installed 2002
Petersburg	6235	12.932	1981mm x 27m cmp	Y	Mitkof Island Fish Passage Improvements	50-0116-1-00396	Installed 2002
Petersburg	6235	15.450	1981mm x ? cmp	Y	Mitkof Island Fish Passage Improvements	50-0116-1-00396	Scheduled 2003
Petersburg	6235	15.846	3048mm x 17m cmp	Y	Mitkof Island Fish Passage Improvements	50-0116-1-00396	Installed 2002
Petersburg	6235	17.071	1981mm x 14m cmp	Y	Mitkof Island Fish Passage Improvements	50-0116-1-00396	Installed 2002
Petersburg	6235	17.334	1981mm x ? cmp	Y	Mitkof Island Fish Passage Improvements	50-0116-1-00396	
Petersburg	6235	17.579	2438mm x 13m cmp	Y	Mitkof Island Fish Passage Improvements	50-0116-1-00396	Installed 2002
Petersburg	6245	1.256	2413mm x 1702mm x 20m arch	Y	Mitkof Island Fish Passage Improvements	50-0116-1-00396	Scheduled 2003
Petersburg	6245	1.503	1981mm x ? cmp	Y	Mitkof Island Fish Passage Improvements	50-0116-1-00396	Scheduled 2003

Ranger District	Route Number	Milepost	Structure	Fish Passage Required	Project	Contract	Status
Petersburg	6245	4.690	2134mm x 17m cmp	Y	Mitkof Island Fish Passage Improvements	50-0116-1-00396	Scheduled 2003
Petersburg	6245	4.962	1981mm x ? cmp	Y	Mitkof Island Fish Passage Improvements	50-0116-1-00396	Scheduled 2003
Petersburg	6245	8.562	2438mm x 15m cmp	Y	Mitkof Island Fish Passage Improvements	50-0116-1-00396	Scheduled 2003
Petersburg	40000	2.492	1981mm x 16m cmp	Y	Mitkof Island Fish Passage Improvements	50-0116-1-00396	Installed 2002
Petersburg	40000	3.129	1524mm x 12m	Y	Mitkof Island Fish Passage Improvements	50-0116-1-00396	Installed 2002
Petersburg	40000	3.194	2845mm x 1905mm x 17m arch	Y	Mitkof Island Fish Passage Improvements	50-0116-1-00396	Installed 2002
Petersburg	40000	3.292	1500mm x 17m cmp	Y	Mitkof Island Fish Passage Improvements	50-0116-1-00396	Installed 2002
Petersburg	40000	3.337	2.972mm x 2000mm x 20m arch	Y	Mitkof Island Fish Passage Improvements	50-0116-1-00396	Installed 2002
Petersburg	40000	3.356	3353mm x 19m cmp	Y	Mitkof Island Fish Passage Improvements	50-0116-1-00396	Installed 2002
Petersburg	40000	3.552	1854mm x 1397mm x 16m arch	Y	Mitkof Island Fish Passage Improvements	50-0116-1-00396	Installed 2002
Petersburg	40000	3.739	1981mm x 12m cmp	Y	Mitkof Island Fish Passage Improvements	50-0116-1-00396	Installed 2002
Petersburg	40000	5.001	2134mm x 18m cmp	Y	Mitkof Island Fish Passage Improvements	50-0116-1-00396	Installed 2002
Petersburg	6402	7.870	2970mm x2010mm	Y	Kuiu Fish Passage Improvements	50-0116-1-00417 in final design	Scheduled 2003
Petersburg	6402	11.170	87" x 63" x 68'	Y	Kuiu Fish Passage Improvements	50-0116-1-00417 in final design	Scheduled 2003
Petersburg	6407	0.120	120" bottomless	Y	Kuiu Fish Passage Improvements	50-0116-1-00417 in final design	Scheduled 2003
Petersburg	6407	1.200	144" bottomless	Y	Kuiu Fish Passage Improvements	50-0116-1-00417 in final design	Scheduled 2003

Ranger District	Route Number	Milepost	Structure	Fish Passage Required	Project	Contract	Status
Petersburg	6407	1.740	60" x 40'	Y	Kuiu Fish Passage Improvements	50-0116-1-00417 in final design	Scheduled 2003
Petersburg	6407	2.730	48" x 34'	Y	Kuiu Fish Passage Improvements	50-0116-1-00417 in final design	Scheduled 2003
Petersburg	6407	4.530	60" x 40'	Y	Kuiu Fish Passage Improvements	50-0116-1-00417 in final design	Scheduled 2003
Petersburg	6407	4.560	Retrofit	Y	Kuiu Fish Passage Improvements	50-0116-1-00417 in final design	Scheduled 2003
Petersburg	6407	6.210	60" x 34'	Y	Kuiu Fish Passage Improvements	50-0116-1-00417 in final design	Scheduled 2003
Petersburg	6415	12.730	60" x 42'	Y	Kuiu Fish Passage Improvements	50-0116-1-00417 in final design	Scheduled 2003
Petersburg	6420	2.100	Retrofit	Y	Kuiu Fish Passage Improvements	50-0116-1-00417 in final design	Scheduled 2003
Petersburg	6402	36.190	24384mm (80') modular bridge		Kuiu Pipe and Bridge Replacements	50-0116-3-00551	Scheduled 2003
Petersburg	6402	19.310	4270mm x 2210mm open bottom		Kuiu Pipe and Bridge Replacements	50-0116-3-00551	Scheduled 2003
Petersburg	6282	2.021	135' bridge		Install bridge from Corner Bay	Being prepared	Scheduled 2003
Petersburg	6314	5.064	50' Big R Bridge	Y	Tongass Log Stringer Bridge Replacement	50-0116-2-00462	Scheduled 2003
Petersburg	6314	5.954	50' Big R Bridge	Y	Tongass Log Stringer Bridge Replacement	50-0116-2-00462	Scheduled 2003
Petersburg	6326	4.402	80' Big R Bridge	Y	Tongass Log Stringer Bridge Replacement	50-0116-2-00462	Scheduled 2003
Sitka	8577	0.100	1800mm x 17m cmp	Y	Chichagof Island Fish Passage Improvements	50-0116-2-00517	Scheduled 2003
Sitka	8578	0.219	1800mm x 12m cmp	Y	Chichagof Island Fish Passage Improvements	50-0116-2-00517	Scheduled 2003
Sitka	8578	0.608	1500mm x 13m cmp	Y	Chichagof Island Fish Passage Improvements	50-0116-2-00517	Scheduled 2003

Ranger District	Route Number	Milepost	Structure	Fish Passage Required	Project	Contract	Status
Sitka	8578	0.887	1800mm x 16m cmp	Y	Chichagof Island Fish Passage Improvements	50-0116-2-00517	Scheduled 2003
Sitka	8578	0.928	1500mm x 18m cmp	Y	Chichagof Island Fish Passage Improvements	50-0116-2-00517	Scheduled 2003
Sitka	8578	0.958	1500mm x 14m cmp	Y	Chichagof Island Fish Passage Improvements	50-0116-2-00517	Scheduled 2003
Sitka	8578	1.203	1500mm x 13m cmp	Y	Chichagof Island Fish Passage Improvements	50-0116-2-00517	Scheduled 2003
Sitka	8578	2.196	Est. 60" with weirs	Y	Not in contract		?
Sitka	8578	2.360	1500mm x 11m cmp	Y	Chichagof Island Fish Passage Improvements	50-0116-2-00517	Scheduled 2003
Sitka	8578	2.445	1500mm x 12m cmp	Y	Chichagof Island Fish Passage Improvements	50-0116-2-00517	Scheduled 2003
Sitka	8578	2.906	2000mm x 16m cmp	Y	Chichagof Island Fish Passage Improvements	50-0116-2-00517	Scheduled 2003
Sitka	8578	3.020	1500mm x 13m cmp	Y	Chichagof Island Fish Passage Improvements	50-0116-2-00517	Scheduled 2003
Sitka	8578	3.168	1800mm x 13m cmp	Y	Chichagof Island Fish Passage Improvements	50-0116-2-00517	Scheduled 2003
Sitka	8578	3.218	1800mm x 18m cmp	Y	Chichagof Island Fish Passage Improvements	50-0116-2-00517	Scheduled 2003
Sitka	8578	3.342	1500mm x 11m cmp	Y	Chichagof Island Fish Passage Improvements	50-0116-2-00517	Scheduled 2003
Sitka	8578	3.386	1500mm x 13m cmp	Y	Chichagof Island Fish Passage Improvements	50-0116-2-00517	Scheduled 2003
Sitka	8578	3.511	1800mm x 16m cmp	Y	Chichagof Island Fish Passage Improvements	50-0116-2-00517	Scheduled 2003
Sitka	8578	3.532	1500mm x 16m cmp	Y	Chichagof Island Fish Passage Improvements	50-0116-2-00517	Scheduled 2003
Sitka	8578	3.764	1800mm x 15m cmp	Y	Chichagof Island Fish Passage Improvements	50-0116-2-00517	Scheduled 2003

Ranger District	Route Number	Milepost	Structure	Fish Passage Required	Project	Contract	Status
Sitka	7540	6.827	3000mm x 14m cmp	Y	North Tongass Fish Passage Corner Bay	In final design process	Scheduled 2003
Sitka	7540	7.267	1500mm x 11m cmp	Y	North Tongass Fish Passage Corner Bay	In final design process	Scheduled 2003
Sitka	7551	0.168	1500mm x 15m cmp	Y	North Tongass Fish Passage Corner Bay	In final design process	Scheduled 2003
Sitka	7540	7.755	1500mm x 18m cmp	Y	North Tongass Fish Passage Corner Bay	In final design process	Scheduled 2003
Sitka	7540	7.981	8000mm (26') panel bridge	Y	North Tongass Fish Passage Corner Bay	In final design process	Scheduled 2003
Sitka	7540	8.143	1500mm x 11m cmp	Y	North Tongass Fish Passage Corner Bay	In final design process	Scheduled 2003
Sitka	7540	8.184	1500mm x 16m cmp	Y	North Tongass Fish Passage Corner Bay	In final design process	Scheduled 2003
Sitka	7540	8.980	1500mm x 17m cmp	Y	North Tongass Fish Passage Corner Bay	In final design process	Scheduled 2003
Sitka	7540	10.368	8000mm(26') panel bridge	Y	North Tongass Fish Passage Corner Bay	In final design process	Scheduled 2003
Sitka	7540	14.008	1500mm x 15m cmp	Y	North Tongass Fish Passage Corner Bay	In final design process	Scheduled 2003
Sitka	7542	0.027	4340mm x 2790mm x 22m cmpa	Y	North Tongass Fish Passage Corner Bay	In final design process	Scheduled 2003
Sitka	7542	0.109	1500mm x 13m cmp	Y	North Tongass Fish Passage Corner Bay	In final design process	Scheduled 2003
Sitka	7542	0.236	8000mm (26') panel bridge	Y	North Tongass Fish Passage Corner Bay	In final design process	Scheduled 2003
Sitka	7542	0.314	1500mm x 12m cmp	Y	North Tongass Fish Passage Corner Bay	In final design process	Scheduled 2003
Sitka	7542	1.887	1500mm x 11m cmp	Y	North Tongass Fish Passage Corner Bay	In final design process	Scheduled 2003
Sitka	7520	7.811	3600mm x 15m cmp	Y	North Tongass Fish Passage Corner Bay	In final design process	Scheduled 2003

Ranger District	Route Number	Milepost	Structure	Fish Passage Required	Project	Contract	Status
Sitka	7624	0.106	8000mm (26') panel bridge	Y	North Tongass Fish Passage Corner Bay	In final design process	Scheduled 2003
Sitka	7540CB	0.970	135' bridge at Corner Bay		Remove bridge and reinstall on PBG rd 6282 mp 2.021	Being prepared	Scheduled 2003
Thorne Bay	2000000	72.499	Ex. 96"	Y	Fed Highways	53-0116-9-00366 task order 1 2001	Under contract
Thorne Bay	2000000	76.267	Ex. 48"	Y	Fed Highways	53-0116-9-00366 task order 1 2001	Under contract
Thorne Bay	2000000	76.527	Ex. 54x63	Y	Fed Highways	53-0116-9-00366 task order 1 2001	Under contract
Thorne Bay	2000000	76.978	Ex. 60"	Y	Fed Highways	53-0116-9-00366 task order 1 2001	Under contract
Thorne Bay	2000000	77.077	Ex. 48"	Y	Fed Highways	53-0116-9-00366 task order 1 2001	Under contract
Thorne Bay	2000000	77.284	Ex. 48"	N	Fed Highways	53-0116-9-00366 task order 1 2001	Under contract
Thorne Bay	2000000	77.608	Ex. 60"	Y	Fed Highways	53-0116-9-00366 task order 1 2001	Under contract
Thorne Bay	2000000	77.820	Ex. 60"	Y	Fed Highways	53-0116-9-00366 task order 1 2001	Under contract
Thorne Bay	2000000	80.356	Ex. 48"	Y	Fed Highways	53-0116-9-00366 task order 1 2001	Under contract
Thorne Bay	2000000	80.713	Ex. 60"	Y	Fed Highways	53-0116-9-00366 task order 1 2001	Under contract
Thorne Bay	2050050	0.820	Ex. 108"	Y	Fed Highways	53-0116-9-00366 task order 4 2000	Surveyed
Thorne Bay	2050400	0.160	Ex. 36" In POW II	Y	Fed Highways	53-0116-9-00366 task order 4 2000	Surveyed
Thorne Bay	2050400	0.560	Ex. 48" In POW II	Y	Fed Highways	53-0116-9-00366 task order 4 2000	Surveyed

Ranger District	Route Number	Milepost	Structure	Fish Passage Required	Project	Contract	Status
Thorne Bay	2050400	3.350	Ex. 36"	Y	Fed Highways	53-0116-9-00366 task order 4 2000	Surveyed
Thorne Bay	2054200	0.730	Ex. 36" In POW II	Y	Fed Highways	53-0116-9-00366 task order 4 2000	Surveyed
Thorne Bay	2058000	0.710	70' mod. Naukati bridge	Y	Fed Highways	53-0116-9-00366 task order 4 2000	Surveyed
Thorne Bay	3000000	18.490	Ex. 76 x 120	Y	Fed Highways	53-0116-9-00366 task order 1 2001	Under contract
Thorne Bay	3000000	18.580	Ex. 60"	Y	Fed Highways	53-0116-9-00366 task order 1 2001	Under contract
Thorne Bay	3000000	19.600	Ex. 60"	N	Fed Highways	53-0116-9-00366 task order 1 2001	Under contract
Thorne Bay	3000000	20.770	Ex. 60"	Y	Fed Highways	53-0116-9-00366 task order 1 2001	Under contract
Thorne Bay	3000000	21.370	Ex. 48"	Y	Fed Highways	53-0116-9-00366 task order 1 2001	Under contract
Thorne Bay	3000000	23.230	Slide Creek bridge	Y	Fed Highways	53-0116-9-00366 task order 1 2001	Under contract
Thorne Bay	3000000	23.950	Barren Creek bridge	Y	Fed Highways	53-0116-9-00366 task order 1 2001	Under contract
Thorne Bay	3015600	1.140	30" Hamilton Fiddler Ck. In Tong. Log Stringer Replacement	Y	Fed Highways	53-0116-9-00366 task order 4 2000	Surveyed
Thorne Bay	2054000	2.220	1500 mm x 11m cmp	Y	POW Fish Passage Improvements	50-0116-2-00494	Installed 2002
Thorne Bay	2054000	3.560	1500 mm x 12m cmp	Y	POW Fish Passage Improvements	50-0116-2-00494	Installed 2002
Thorne Bay	2054000	3.780	1500 mm x 13m cmp	Y	POW Fish Passage Improvements	50-0116-2-00494	Installed 2002
Thorne Bay	2054300	0.460	4340mm x 2790mm x 16m cmpa	Y	POW Fish Passage Improvements	50-0116-2-00494	Installed 2002

Ranger District	Route Number	Milepost	Structure	Fish Passage Required	Project	Contract	Status
Thorne Bay	3000000	48.340	Replaced by 40' slab bridge	Y	POW Fish Passage Improvements	50-0116-2-00494	Scheduled 2003
Thorne Bay	3000000	52.240	1500 mm x 11m cmp	Y	POW Fish Passage Improvements	50-0116-2-00494	Scheduled 2003
Thorne Bay	3000000	60.550	3600mm x 1800mm x 15m bottomless arch	Y	POW Fish Passage Improvements	50-0116-2-00494	Scheduled 2003
Thorne Bay	3000000	60.670	1800mm x 14m cmp	Y	POW Fish Passage Improvements	50-0116-2-00494	Scheduled 2003
Thorne Bay	3000000	61.680	3300mm x 1650mm x 13m bottomless arch	Y	POW Fish Passage Improvements	50-0116-2-00494	Installed 2002
Thorne Bay	3000000	62.430	2000mm x 22m cmp	Y	POW Fish Passage Improvements	50-0116-2-00494	Scheduled 2003
Thorne Bay	3000000	62.520	4340mm x 2790mm x 22m cmpa	Y	POW Fish Passage Improvements	50-0116-2-00494	Scheduled 2003
Thorne Bay	3000000	62.890	Est. 40 ft slab	Y	Not in contract		?
Thorne Bay	3000000	64.880	4340mm x 2790mm x 18m cmpa	Y	POW Fish Passage Improvements	50-0116-2-00494	Scheduled 2003
Thorne Bay	3000340	1.650	Deleted from contract	Y	POW Fish Passage Improvements	50-0116-2-00494	Scheduled 2003
Thorne Bay	3013200	2.180	Est. 72"	Y	Not in contract		?
Thorne Bay	3030850	0.270	1450mm x 1675mm x 9.15m recast concrete	Y	POW Fish Passage Improvements	50-0116-2-00494	Installed 2002
Thorne Bay	3030850	0.300	1500mm x 12m cmp	Y	POW Fish Passage Improvements	50-0116-2-00494	Installed 2002
Thorne Bay	3030850	0.480	1370mm x 1370mm x 9.15m precast concrete	Y	POW Fish Passage Improvements	50-0116-2-00494	Installed 2002

Ranger District	Route Number	Milepost	Structure	Fish Passage Required	Project	Contract	Status
Thorne Bay	2059300	1.120	2410mm x 1700mm x 13m arch	Y	POW Island Fish Passage Improvements II	In final design process	Scheduled 2003
Thorne Bay	2000860	0.659	2600mm x 1820mm x 12m arch	Y	POW Island Fish Passage Improvements II	In final design process	Scheduled 2003
Thorne Bay	2000000	125.242	2970mm x 2010mm x 19m arch	Y	POW Island Fish Passage Improvements II	In final design process	Scheduled 2003
Thorne Bay	2050400	0.560	2840mm x 1910mm x 15m arch	Y	POW Island Fish Passage Improvements II	In final design process	Scheduled 2003
Thorne Bay	2050300	0.870	2410mm x 1700mm x 19m arch	Y	POW Island Fish Passage Improvements II	In final design process	Scheduled 2003
Thorne Bay	2000780	0.303	4340mm x 2790mm x 13m arch	Y	POW Island Fish Passage Improvements II	In final design process	Scheduled 2003
Thorne Bay	2054000	0.020	1980mm x 37m cmp	Y	POW Island Fish Passage Improvements II	In final design process	Scheduled 2003
Thorne Bay	2050200	0.550	1500mm x 12m cmp	Y	POW Island Fish Passage Improvements II	In final design process	Scheduled 2003
Thorne Bay	2050200	0.220	1810mm x 21m cmp	Y	POW Island Fish Passage Improvements II	In final design process	Scheduled 2003
Thorne Bay	2054200	0.730	2060mm 1500mm x 13m arch	Y	POW Island Fish Passage Improvements II	In final design process	Scheduled 2003
Thorne Bay	2054200	5.780	1500mm x 11m cmp	Y	POW Island Fish Passage Improvements II	In final design process	Scheduled 2003
Thorne Bay	2050400	0.160	1500mm x 11m cmp	Y	POW Island Fish Passage Improvements II	In final design process	Scheduled 2003
Thorne Bay	3015600	1.140	60' Big R Bridge	Y	Tongass Log Stringer Bridge Replacement	50-0116-2-00462	Scheduled 2003
Thorne Bay	1520000	3.910	70' Big R Bridge	Y	Tongass Log Stringer Bridge Replacement	50-0116-2-00462	Scheduled 2003
Thorne Bay	2083000	1.819	Est. 70" bridge		Buster Creek Log Bridge Replacement	Survey/design/ build shelf project not awarded	Scheduled 2004

Ranger District	Route Number	Milepost	Structure	Fish Passage Required	Project	Contract	Status
Thorne Bay	2083000	6.491	Est. 70" bridge		Buster Creek Log Bridge Replacement	Survey/design/ build shelf project not awarded	Scheduled 2004
Thorne Bay	2083000	5.610	Est. 60" bridge		Buster Creek Log Bridge Replacement	Survey/design/ build shelf project not awarded	Scheduled 2004
Thorne Bay	3030	27+847.8	1800mm cmp	Y	Coffman Cove survey/design/ build	50-0109-1-00584 design in progress	Scheduled 2003
Thorne Bay	3030	27+938	1800mm cmp	Y	Coffman Cove survey/design/ build	50-0109-1-00584 design in progress	Scheduled 2003
Thorne Bay	3030	28+462.8	1800 mm cmp	Y	Coffman Cove survey/design/ build	50-0109-1-00584 design in progress	Scheduled 2003
Thorne Bay	3030	28+806.8	4750mm x 3200 cmpa	Y	Coffman Cove survey/design/ build	50-0109-1-00584 design in progress	Scheduled 2003
Thorne Bay	3030	29+842.3	1800 cmp	Y	Coffman Cove survey/design/ build	50-0109-1-00584 design in progress	Scheduled 2003
Thorne Bay	3030	30+451.9	3470mm x 2220mm cmpa	Y	Coffman Cove survey/design/ build	50-0109-1-00584 design in progress	Scheduled 2003
Thorne Bay	3030	30+538	40' panel bridge Chum Creek	Y	Coffman Cove survey/design/ build	50-0109-1-00584 design in progress	Scheduled 2003
Thorne Bay	3030	30+724	1800 mm cmp	Y	Coffman Cove survey/design/ build	50-0109-1-00584 design in progress	Scheduled 2003
Thorne Bay	2360000				Fed Hwy Project Coffman Jct to Rd 3000000		
Thorne Bay	3000000				Fed Hwy Project Logjam to Coffman Creek		
Thorne Bay	2000000				Fed Hwy Project Coffman jct north		
Thorne Bay	3000000				Fed Hwy Project Sandy Beach		
Wrangell	6299	2.263	2050mm x 1500mm x 18m arch	Y	North Tongass Fish passage Wrangell	Not awarded yet	Scheduled 2003

Ranger District	Route Number	Milepost	Structure	Fish Passage Required	Project	Contract	Status
Wrangell	6299	2.508	1950mm x 18m cmp	Y	North Tongass Fish passage Wrangell	Not awarded yet	Scheduled 2003
Wrangell	6299	2.531	1500mm cmp (infill only)	Y	North Tongass Fish passage Wrangell	Not awarded yet	Scheduled 2003
Wrangell	6299	2.544	1500mm cmp (infill only)	Y	North Tongass Fish passage Wrangell	Not awarded yet	Scheduled 2003
Wrangell	6299	2.577	1800mm x 21m cmp	Y	North Tongass Fish passage Wrangell	Not awarded yet	Scheduled 2003
Wrangell	6299	7.246	2400mm x 1720mm x 21m arch	Y	North Tongass Fish passage Wrangell	Not awarded yet	Scheduled 2003
Wrangell				Y	North Tongass Fish Passage II Zarembo Island will have 17 sites	Survey/design contract not awarded yet	Scheduled 2004

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